

Discovery 2019 Announcement of Opportunity (AO)
LAUNCH SERVICES INFORMATION SUMMARY
9 Apr 2019

NASA-Provided Launch Services Ground Rules/Policy

This document provides additional information for Discovery-provided launch services.

NASA Launch Services Program Point of Contact for Additional Information

Additional information including performance quotes, mission integration inquiries, and costs for non-standard or mission-unique services may be obtained from the point of contact below. Otherwise, questions must be directed as indicated in the Technical and Scientific Inquiries section of the AO.

Mary Faller
Mission Manager
NASA Launch Services Program
Code VA-C
Kennedy Space Center, FL 32899
Phone: 321-867-8943
Email: mary.k.faller@nasa.gov

Any commercial Launch Vehicles (LV) provided by the Discovery Program will be procured and managed by the NASA/Launch Services Program (LSP) using government contracts.

Under the provisions of the NASA Launch Service II (NLS II) contract, the launch service includes the launch vehicle (LV) and associated standard services, non-standard services (mission unique options), all engineering and analysis, and minimum performance standards. LSP also provides launch service contract management, technical management of the launch service, technical insight into the LV production/test, coordinates and approves mission-specific integration activities, provides mission unique LV hardware/software development, provides payload-processing accommodations, and manages the launch campaign/countdown.

At the appropriate time, following mission selection, LSP will competitively select a launch service provider and award a Launch Service Task Order (LSTO) for the mission based on customer requirements. The LSTO is awarded to the Contractor that provides the best value in launch services to meet the Government's requirements based on technical capability/risk, reasonableness of proposed price, and past performance. Accordingly, assumption of a specific launch vehicle configuration as part of the AO proposal will not guarantee that the proposed LV configuration will be selected unless there is firm technical rationale for sole source. Any such rationale should be clearly identified and explained in the proposal.

All NASA-procured launch services are to be consistent with NASA Policy Directive (NPD) 8610.7, NASA Launch Services Risk Mitigation Policy. Launch services acquired by NASA will be managed in accordance with NPD 8610.23, Technical Oversight of Expendable Launch Vehicle (ELV) Launch Services and NPD 8610.24, Launch Services Program (LSP) Pre-Launch Readiness Reviews. These NPD's can be accessed through the URLs:

<http://nodis3.gsfc.nasa.gov/displayDir.cfm?t=NPD&c=8610&s=7D>

Discovery 2019 Announcement of Opportunity (AO)
LAUNCH SERVICES INFORMATION SUMMARY
9 Apr 2019

<http://nodis3.gsfc.nasa.gov/displayDir.cfm?t=NPD&c=8610&s=23C>

<http://nodis3.gsfc.nasa.gov/displayDir.cfm?t=NPD&c=8610&s=24C>

Or, they are located in the AO library.

Dual manifested or secondary payloads will not be considered under this AO.

Contributed Domestic or Foreign Launch Vehicles

Foreign launch vehicles will not be considered under this AO.

Launch Service Information/Configuration/Performance

The proposed spacecraft must be designed to all of the enveloping launch vehicle characteristics (static fairing envelope, sine and random vibe, acoustics, CG Load factors, and shock) and capabilities provided in Attachment 1.

Performance

The Offerors should select the minimum launch service performance class that meets their requirements including adequate performance margins. Attachment 1 describes these performance ranges in terms of mass to orbit (kilograms) for a range of C3 values. The performance data in Attachment 1 is based upon the NASA Launch Services II (NLS II) contracted performance data, industry surveys, emerging vehicle design reviews and recent awards and is to be used for planning purposes only. The Offerors should specifically state in the proposal the launch service performance range to meet their requirements for this mission.

The LSP has developed a performance website for vehicles currently on contract to NASA. This website contains information relevant to NASA-procured launch services. This website does not include emerging vehicles not yet on-ramped to the NLS-II contract. This planning tool can be found at the following web address:

<https://elvperf.ksc.nasa.gov/Pages/Default.aspx>

Access to this site is available to anyone with an internet connection and is generally available at any time. For questions, utilize the point(s) of contact listed in this document.

For variations from the data found in Attachment 1, refer to the LSP Point of Contact for an assessment.

Launch Services

Attachment 1 describes performance ranges for four (4) categories of launch vehicles in the intermediate performance class. **The “baseline” service is based upon the “High” performance curve with a 5-m fairing with a launch readiness date of Dec 31, 2026 or Dec 31, 2029.**

Discovery 2019 Announcement of Opportunity (AO)
LAUNCH SERVICES INFORMATION SUMMARY
9 Apr 2019

Attachment 1 also shows the composite Baseline launch service environments (5-meter, high performance class). The attachment also provides two different performance-specific payload fairing static envelopes (4-meter and 5-meter fairing) that would ensure compatibility across the range of potential launch vehicles currently available under this AO. For missions designed for a performance class other than the Baseline, please contact the NASA LSP POC for environments commensurate with the selected performance class. For any performance class selected, demonstrated compatibility is expected.

Services provided in the launch service costs to be covered by the Discovery Program are:

- the launch vehicle, engineering, analysis, and minimum performance standards and services provided by the NLS contract in place at the time of LV selection;
- mission integration;
- East Coast launch site payload processing;
- range safety support;
- down range telemetry support (launch vehicle data only);
- nominal allocation for non-standard/mission unique launch vehicle modifications/services – items typically necessary to customize the basic vehicle hardware to meet spacecraft driven requirements;

See Attachment 2 for a list of the baseline launch services as well as the launch services provided for nuclear missions provided in the Discovery AO.

Changes to Adjusted AO Cost Cap

Please contact the NASA LSP POC at the beginning of this attachment for pricing information.

Performance: For purposes of this AO, the Adjusted AO Cost Cap is reduced for investigations that require the use of lower performance launch vehicles than the baseline launch service. Alternately, the Adjusted AO Cost Cap is increased for lower performance class launch vehicles. See Section 5.9.2, Table 3 for these costs/credits.

Nuclear: See Attachment 2 for a list of launch services required for a mission utilizing radioactive material that is not contained in the baseline launch services costs. An additional launch service mission-unique charge shall result in a reduction to the Adjusted AO Cost Cap for missions utilizing radioactive materials. For estimated costs for 5-m missions only, see Section 5.9.3, Table 5. For estimated costs for a nuclear 4-m mission, contact the NASA LSP POC; any directly related costs are to be treated as reductions to the Adjusted AO Cost Cap.

Other mission unique or non-standard requirements: For purposes of this AO, any items beyond the baseline launch services must be priced by the LSP POC and may require an additional charge which must be reflected against the PI Managed Mission Costs (PI-MMC).

Launch delays: The Discovery launch service budget set aside for this AO does not include funding for PI caused launch delays.

Discovery 2019 Announcement of Opportunity (AO)
LAUNCH SERVICES INFORMATION SUMMARY
9 Apr 2019

Evaluation Criteria

Attachment 3 shows a preliminary Risk Assessment checklist to be used as a guide for the evaluators during the proposal evaluation phase. This checklist provides an indication of the expected types of information to be contained in the proposals. If the proposal does not provide sufficient information to be evaluated for each section, the launch vehicle section of the proposal may not be evaluated for full content and may be listed as a finding.

Discovery 2019 Announcement of Opportunity (AO)
LAUNCH SERVICES INFORMATION SUMMARY
Attachment 1

Launch Vehicle Characteristics/Capabilities

Payload Fairing Envelope:

Figure 1 and Figure 2 below shows the performance-specific static payload fairing envelopes. Figure 1 is the static envelope associated with the 5-meter payload fairing Low, Medium and High performance classes and Figure 2 is the static envelope associated with the 4-meter payload fairing class payloads. Proposers must use the payload envelope associated with the accompanying performance class to ensure compatibility with all known potential launch vehicle configurations.

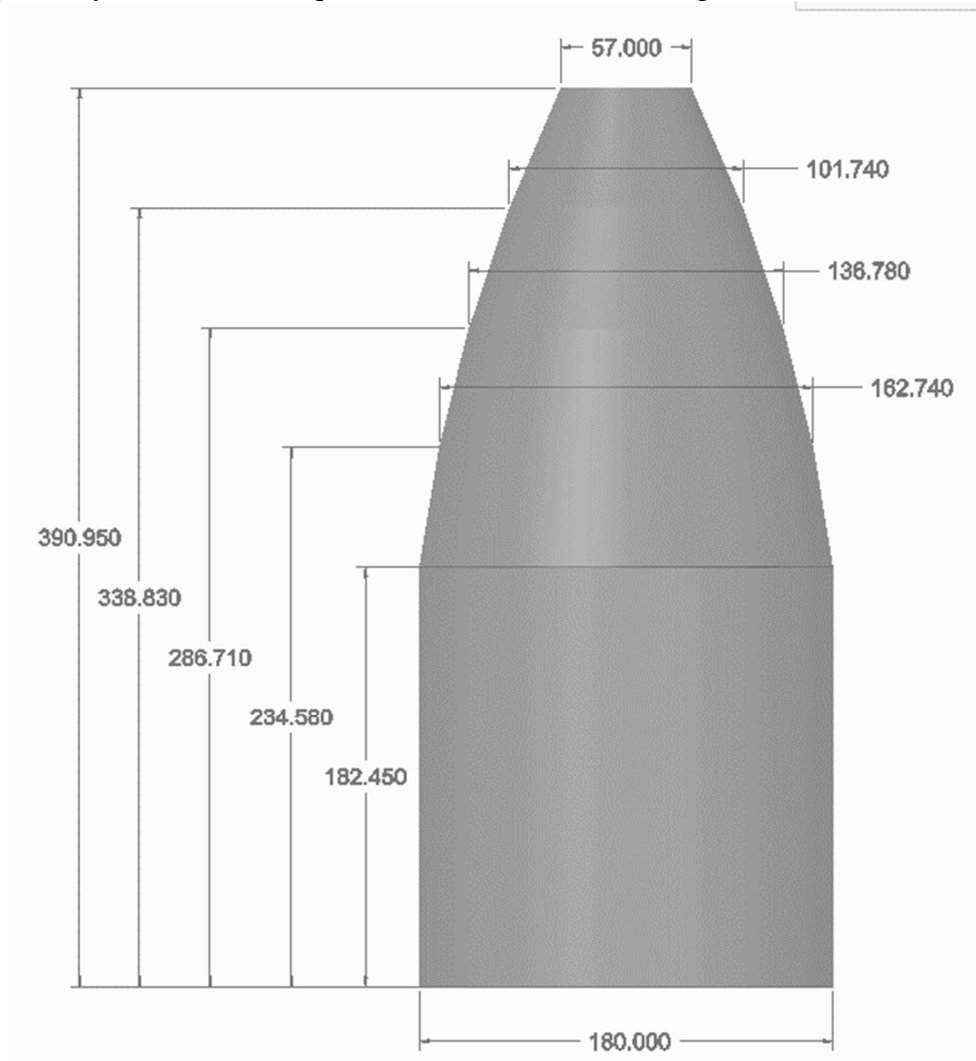


Figure 1: 5m Static Payload Fairing Envelope (Low, Medium and High Performance Class)

**Discovery 2019 Announcement of Opportunity (AO)
LAUNCH SERVICES INFORMATION SUMMARY
Attachment 1**

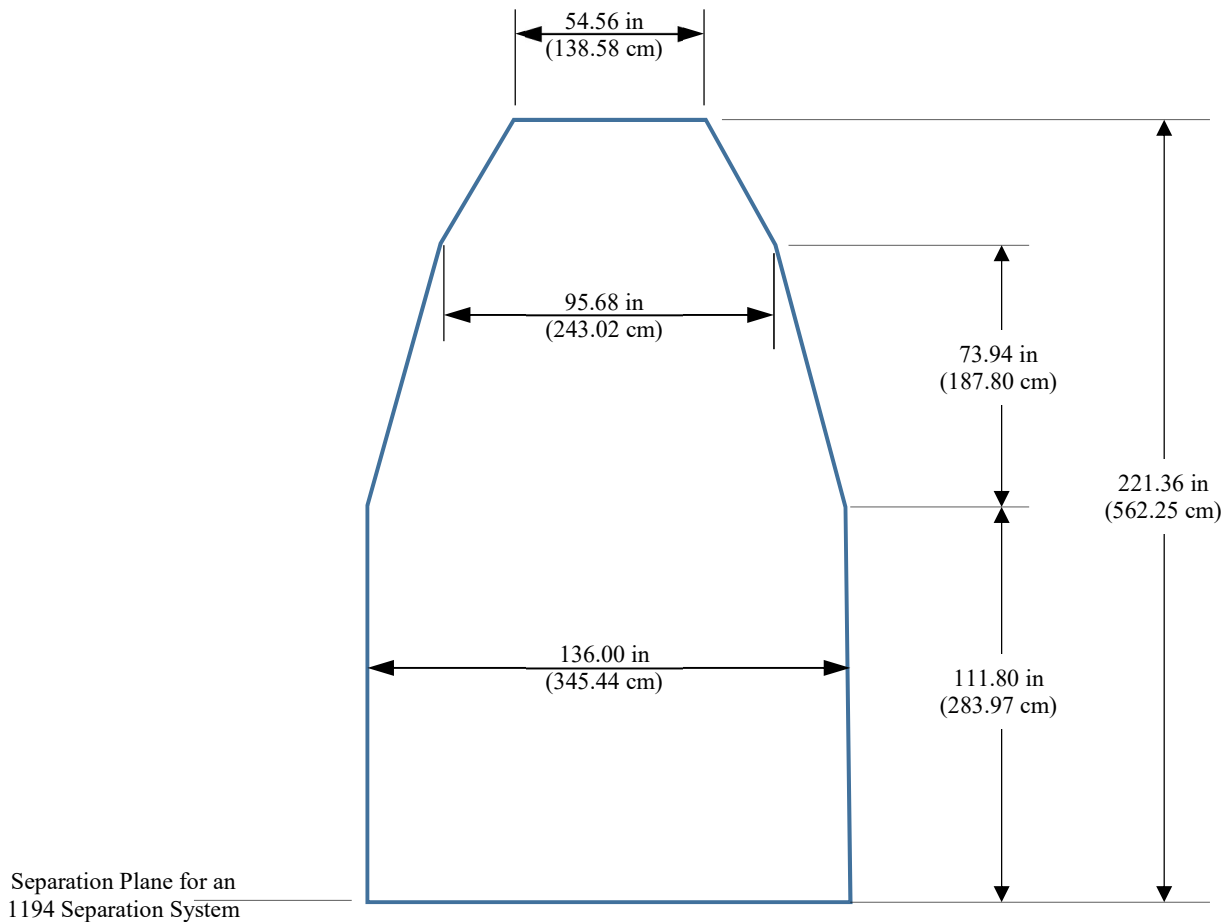


Figure 2: 4m Static Payload Fairing Envelope

Launch Vehicle Environments

Composite launch vehicle environments depicted herein are only for the baseline launch services.

Acoustic environment (fill factor varies from 40-60%) is shown in Figure 3. Shock environment is shown in Figure 4. Payload Interface Random Vibe is shown in Figure 5 (these levels may not envelope low frequency (<50 Hz) payload responses.) LV equivalent sine is shown in Figure 6. CG Load factors, only for spacecraft with a mass greater than 1800 kg, are shown in Figure 7. The maximum positive axial CG Load Factor (compression) is a function of the spacecraft mass.

Contact the LSP POC for additional enveloping environments of other launch services performance classes, lower masses, alternate fill fractions, or any other mission unique requirements or constraints.

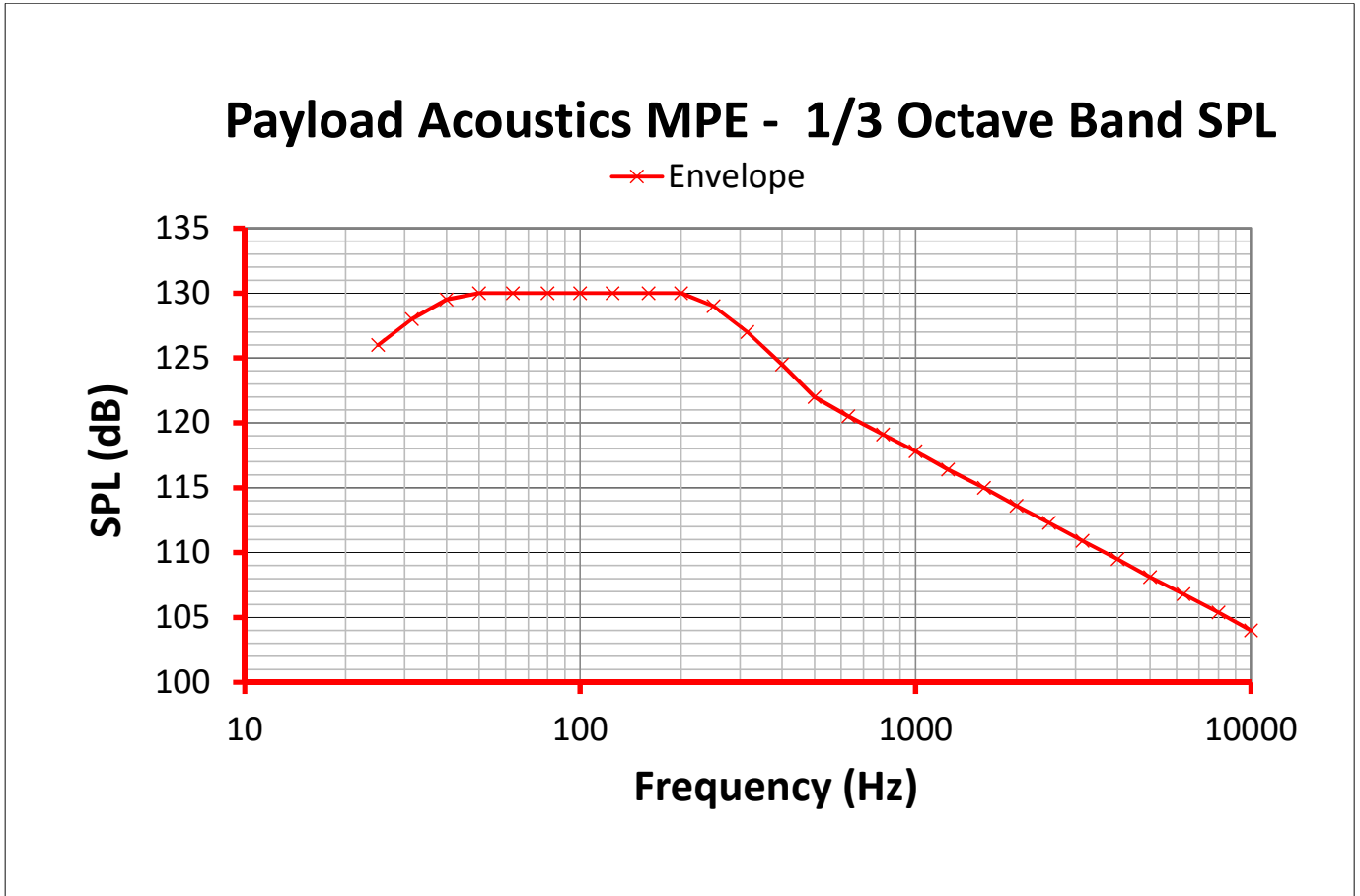


Figure 3 – Acoustics Environment

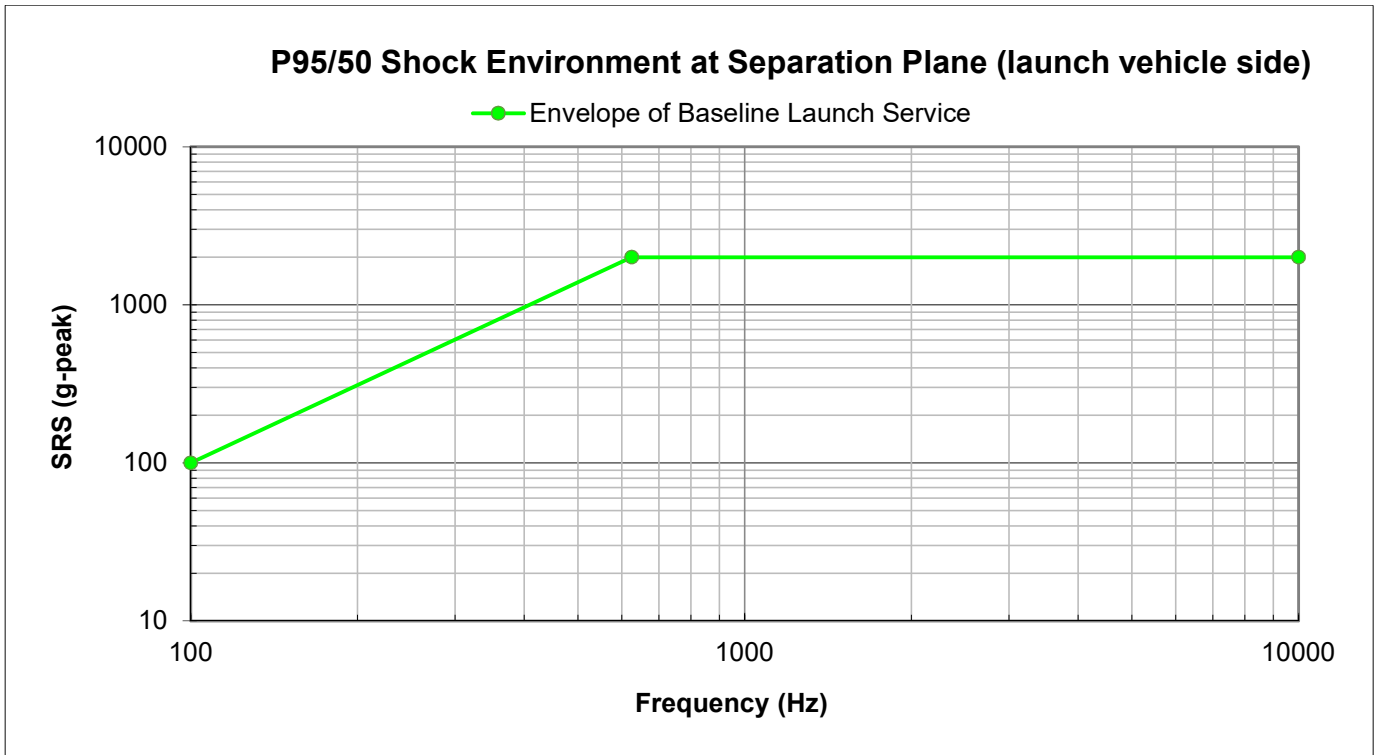


Figure 4 – Shock Environment (Based on NASA Launch Services Program experience)

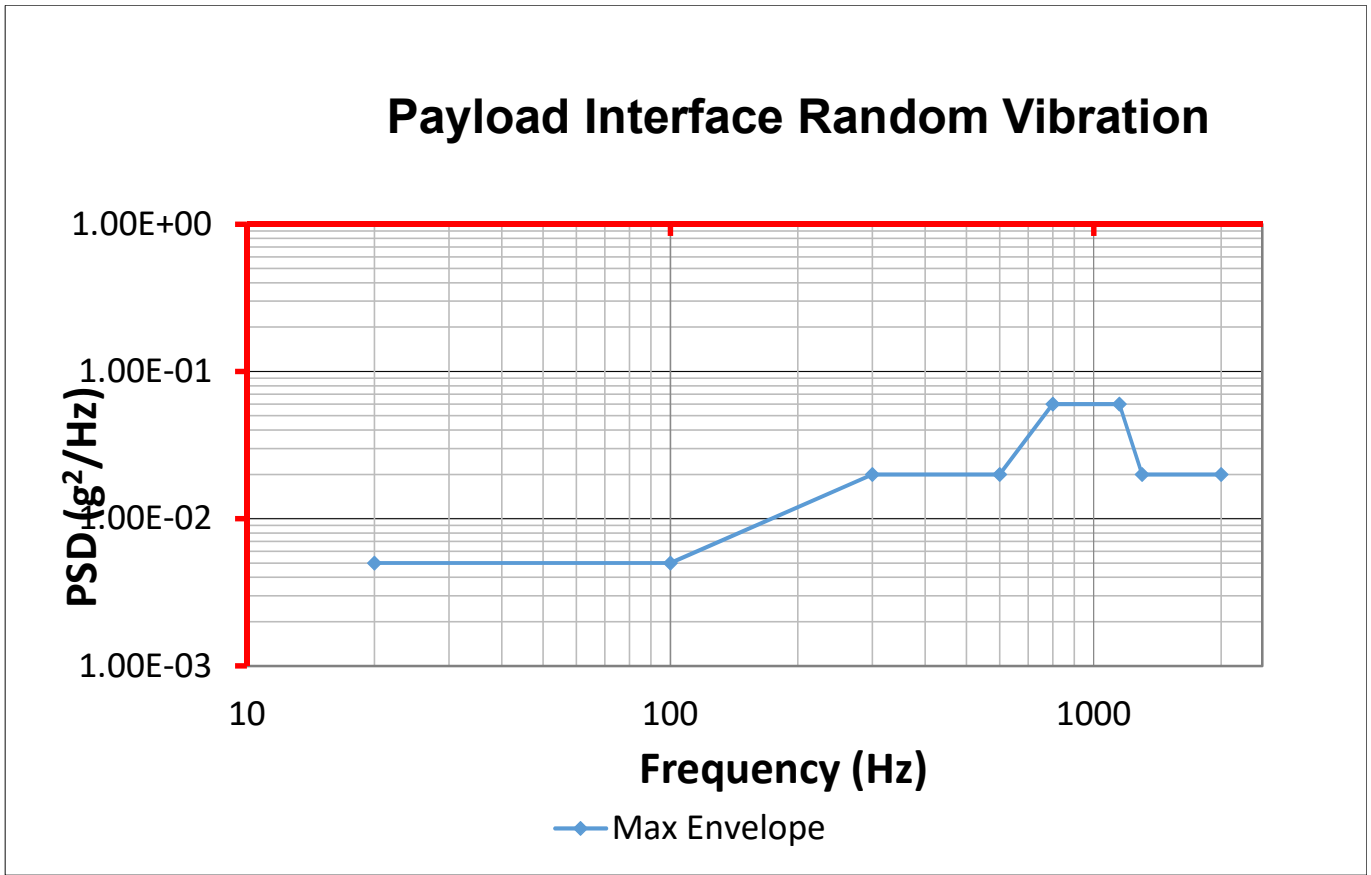


Figure 5 – Payload Interface Random Vibration (P95/50, these levels may not envelope low frequency (<50 Hz) payload responses)

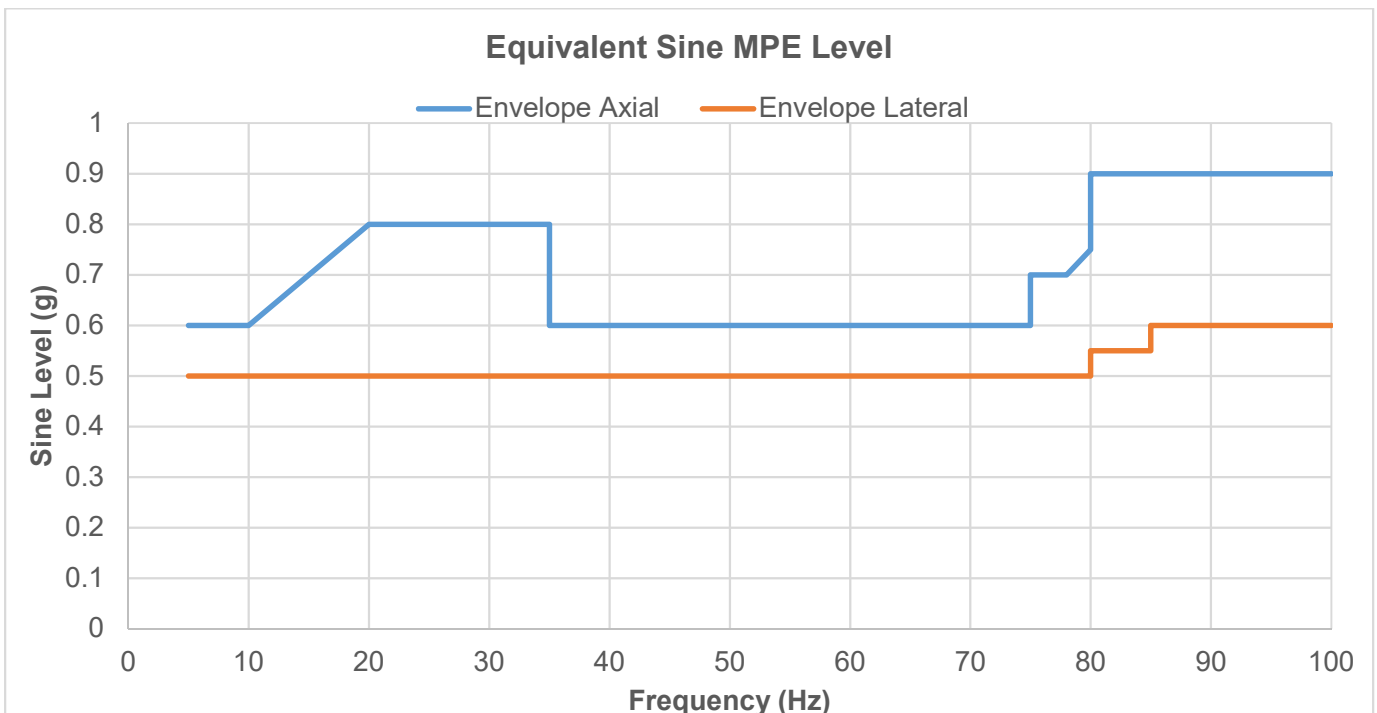


Figure 6 – Launch Vehicle Equivalent Sine

Discovery 2019 Announcement of Opportunity (AO)
LAUNCH SERVICES INFORMATION SUMMARY
Attachment 1

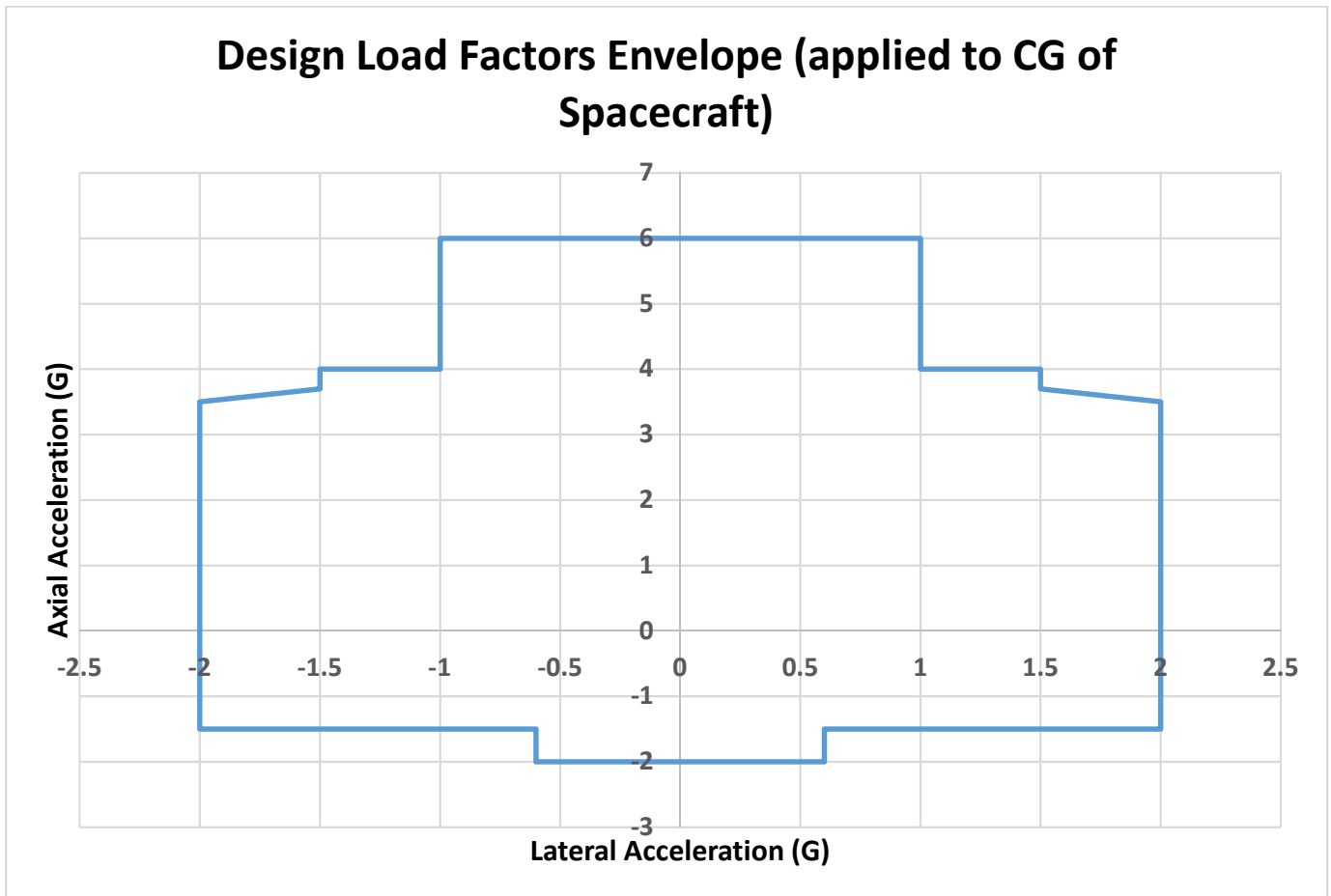


Figure 7 – CG Load Factors (SC mass > 1800 kg only)

Performance:

Performance classes available in this AO are shown in Figures 8 and 9.

Ground Rules:

- This LV performance shown, available on the NLS-II contract, generally does not include impacts associated with orbital debris compliance; this must be evaluated on a mission-specific basis. Depending on the LV configuration, this could result in a significant performance impact to ensure full compliance with orbital debris policy.
- Guidance reserves have been allocated to account for 3-sigma flight performance.
- Baseline 1194-mm marmon-type clampband separation system and payload adapter.
- **Performance is for baseline launch service configuration; non-standard, mission-unique hardware will require additional assessment.**
- **4-m Performance class missions may launch out of Wallops Flight Facility. Contact NASA LSP POC for more information.**

Discovery 2019 Announcement of Opportunity (AO)
LAUNCH SERVICES INFORMATION SUMMARY
Attachment 1

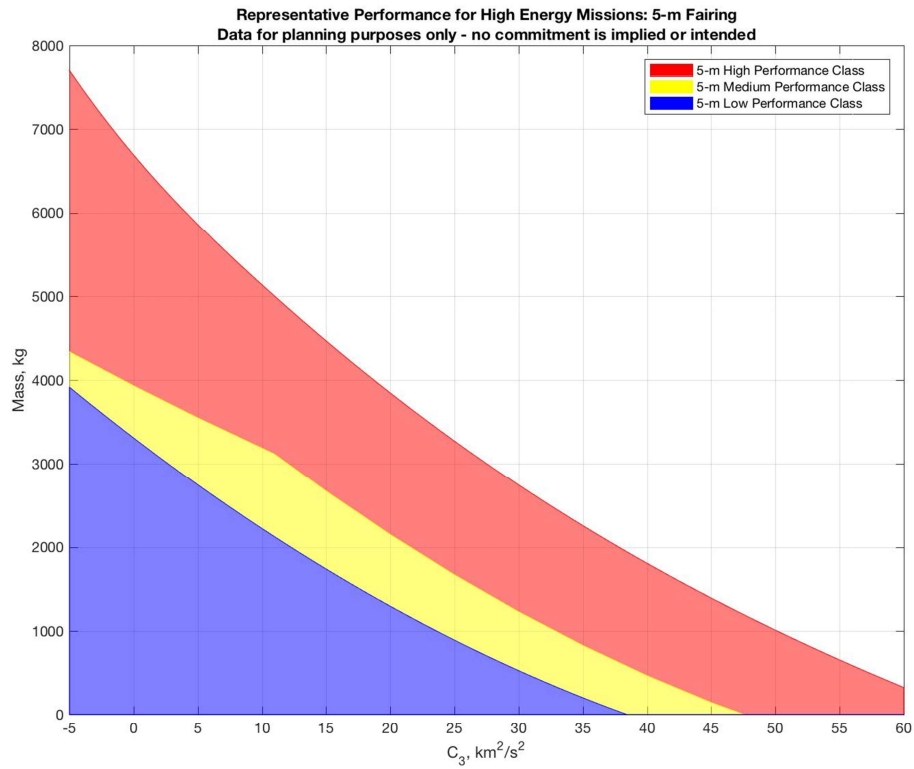


Figure 8 – 5-m payload fairing

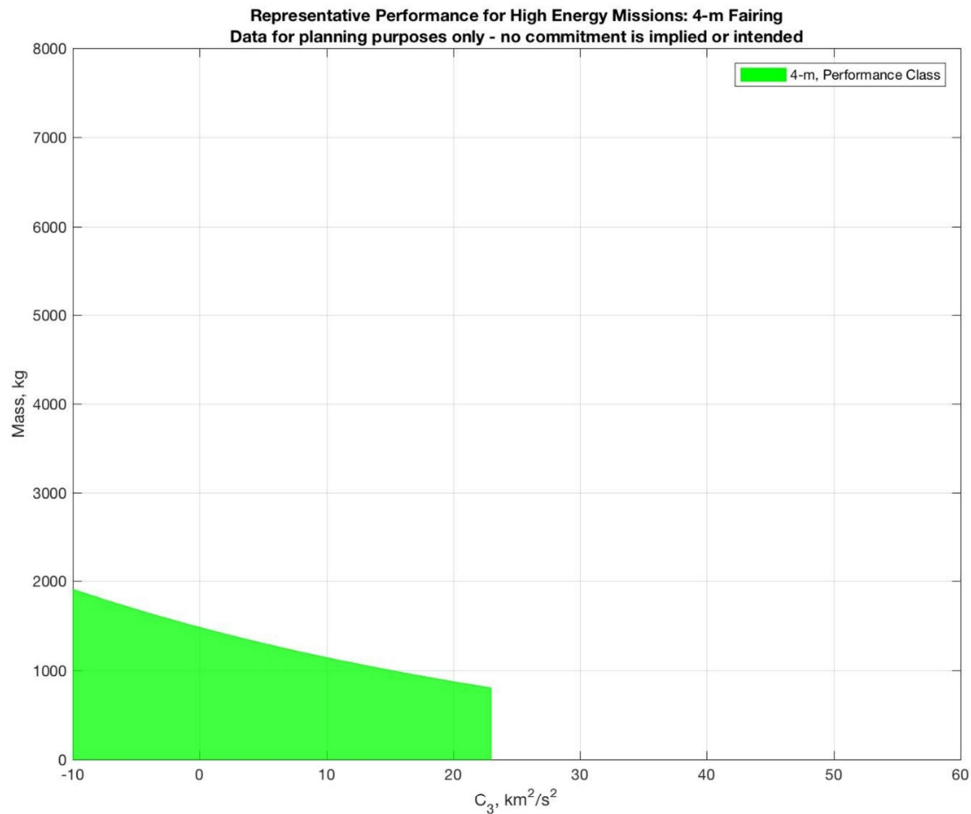


Figure 9 – 4-m payload fairing

**Discovery 2019 Announcement of Opportunity (AO)
LAUNCH SERVICES INFORMATION SUMMARY
Attachment 2**

NASA-LSP - Discovery 2019 - Baseline Launch Services

This list provides an overview of the standard and mission-specific services the spacecraft receives with the NASA-LSP **Baseline** launch service for this AO. If additional services are required but not listed herein, or for any questions, please contact the NASA LSP POC listed in this document.

Integrated Services:

Range support and services
Payload processing facility and support
Contractor engineering support
Base support contractors and logistics
Hazardous support

Nominal Launch Vehicle Services:

Launch vehicle that meets customer's performance for a NLT 31Dec26 or NLT 31Dec29 launch
Payload fairing with approximately two (2) nominal access doors with thermal and/or acoustic blankets (N/A to nuclear payloads)
Standard LV-provided payload separation system
Standard payload adapter
Standard test payload adapter availability
Spacecraft spin/de-spin capability for separation (if required)
Single-Spacecraft
Collision/contamination avoidance maneuver (CCAM) capability if needed
Electrical interface connectors (approximately 3 sets)
Mission unique reviews (approximately 3)
Readiness reviews (approximately 4)
Risk management
Launch vehicle insight and approval
Mission integration management & engineering support
Launch campaign management
Down range telemetry assets for LV data

The following typical Mission Unique Services are included in the baseline vehicle cost:

T-0 Grade B GN2 or pure air purge
ISO 14644-1 Class 7 integration environment
Interleaved Spacecraft Telemetry

**NASA-LSP – Discovery 2019 – Nuclear Non-Standard Launch Service
(Charges against the Adjusted AO Cost Cap provided for 5-m Fairing only)**

NASA-LSP Mission Unique Nuclear Launch Services for Missions utilizing a Radioisotope Heater Unit (RHU) and / or Multi-Mission Radioisotope Thermoelectric Generator (MMRTG):

The following services are not included in the **baseline** launch services costs, and must be added to the PI-MMC (see Section 5.9.3, Table 5), but are required for missions utilizing a RHU/ MMRTG:

NLT 31Dec26 or NLT 31Dec29 launch
Radiological Control Center (RadCC) Support
Additional Pad, RTGF, PHSF Security (Nuclear)
Additional nominal Mission Unique Nuclear Requirements (including one large payload fairing door)
FTS/ADS launch vehicle modifications
NEPA/Launch Approval support Tasks (Nuclear Databooks and launch service contractor support)
Range Support

**Discovery 2019 Announcement of Opportunity (AO)
LAUNCH SERVICES INFORMATION SUMMARY
Attachment 3**

**Risk Assessment Discovery 2019 AO
Launch Services Program**

Proposal Name: _____

Proposal #: _____

Evaluator: _____

Phone: _____

Email: _____

Launch Service Risk Evaluation:

Overall Assessment: - Given the ground rules in the AO, is the proposed launch vehicle (LV), standard services, mission unique services, performance class, costs and concept feasible for this application? (Yes or No)

Areas of risk: _____

LV Performance Summary: Area of risk? (Yes or No)

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): _____ : _____

Orbit requirements: Apogee: _____ km Perigee: _____ km Inclination _____ deg.

High Energy requirements: C₃: _____ km²/sec² DLA: _____ deg RLA: _____ deg

AO Baseline Performance Class (5-m Medium)? (Yes or No)

If not, Proposed Performance Class (4-m, 5-m Low/High): _____

CBE Launch Mass (including reserves) Wet Mass: _____ kg

NTE Launch Mass (including reserves) Wet Mass: _____ kg

Launch 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

Does candidate launch vehicles have adequate performance for the proposed mission? (Yes or No)

LV Performance Risks: _____

**Discovery 2019 Announcement of Opportunity (AO)
LAUNCH SERVICES INFORMATION SUMMARY
Attachment 3**

LV to Spacecraft Interface Summary: Area of risk? (Yes or No)

Payload Fairing (PLF) Interfaces and Access:

Spacecraft (S/C) Dimensions: Radial: _____ m Height _____ m

Any intrusions outside of the AO Baseline PLF usable **STATIC** volume for the given performance class? (Yes or No)

If so, list risks: _____

Are there any special access requirements post-fairing encapsulation? (Yes or No)

If so, list risks: _____

Mechanical Interface:

Is the AO Baseline Adapter (1194) proposed? (Yes or No)

If not, list risks: _____

Electrical Interface:

Are there unique electrical interfaces proposed? (Yes or No)

If so, list risks: _____

Mission Unique or Non-Standard Requirements Proposed:

List of Mission Unique Non-Standard Services proposed that are not part of the AO Baseline launch service offered:

Planetary Protection Requirements: _____

Unique launch or processing Facility Requirements (not yet approved): _____

List Radiological Sources (if applicable): _____

Are facilities, not already approved for use, required to store/process the Radiological Sources? (Yes or No)

Are any LV modifications not included in the AO Baseline service required for additional safety or Launch approval?
(Yes or No)

Launch Service Budget Assessment Summary: Area of risk? (Yes or No)

Are the additional Mission Unique or Non-standard Services not included in the AO Baseline service covered by mission flex funding allocated by LSP? (Yes or No)

If not, list risks: _____

Has additional funding been identified in the PI-Managed Mission Cost (PI-MMC)? (Yes or No)

If not, list risks: _____

**Discovery 2019 Announcement of Opportunity (AO)
LAUNCH SERVICES INFORMATION SUMMARY
Attachment 3**

S/C Schedule Summary: Area of risk? (Yes or No)

Launch Service Integration time 30+/-3 months? (Yes or No)

SC Environmental Test program end date L-_____mo

Delivery of verified SC loads model delivery to LSP at L-10 months or earlier? (Yes or No)

SC Ship date L-_____mo

SC to LV integrated operations L-_____days

Describe risk of missing the proposed launch date due to spacecraft schedule (environmental testing, launch processing, LV integration): _____

Other identified cost, technical, schedule risks?: Area of risk? (Yes or No)

List Risks:

END OF DOCUMENT