NASA
Launch Services Program

Explores AO Pre-Proposal Conference
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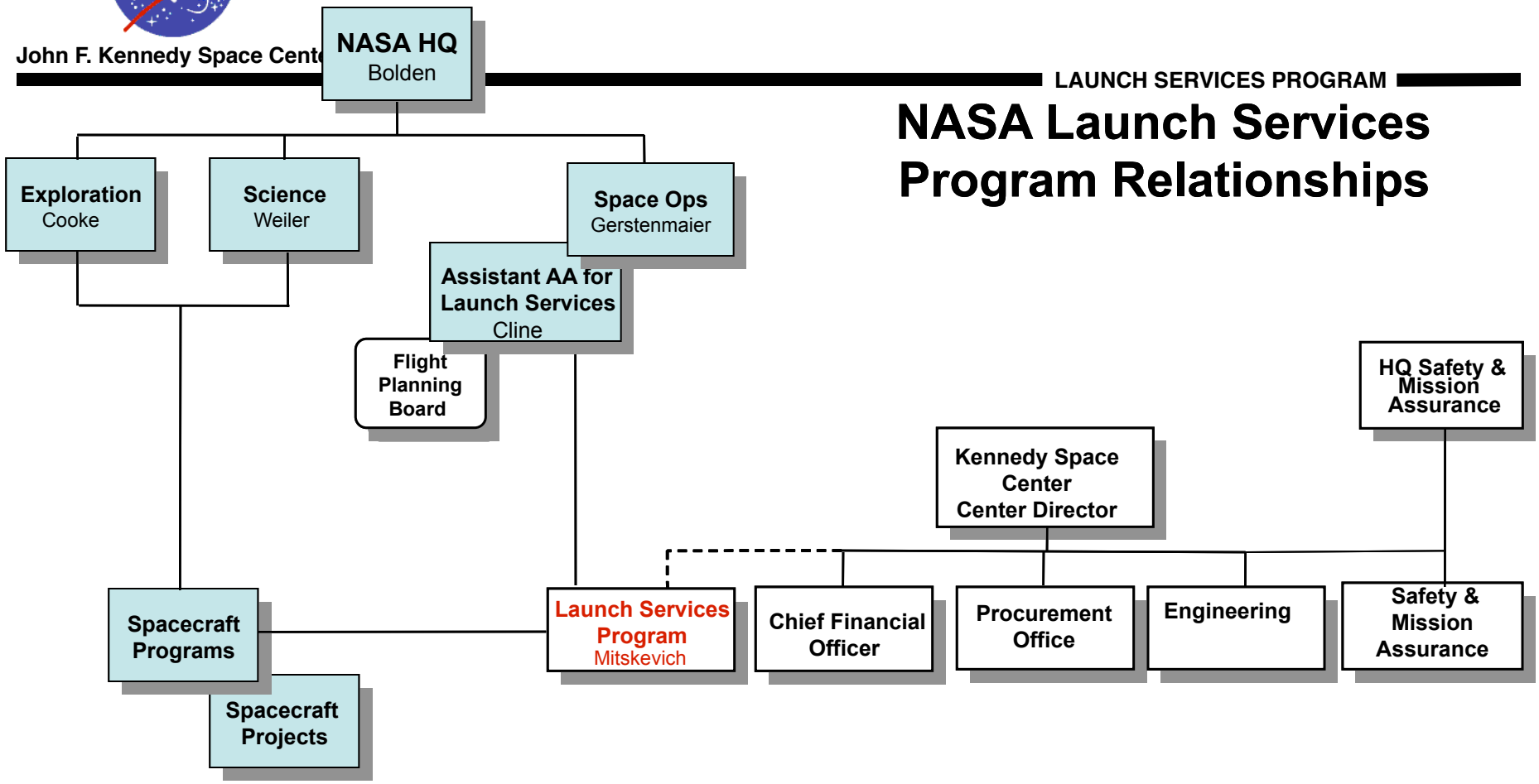
NASA Launch Services Program Relationships



Interfaces to other NASA Centers

GRC Technical Support

SSC Propulsion Support

GSFC Spacecraft Projects

MSFC Technical Support

JPL Spacecraft Projects

ARC Spacecraft Projects

Launch Services Program

The Launch Services Program provides management of the launch service, technical oversight of the launch vehicle production/ test, coordinates and approves mission-specific integration activities, provides mission unique launch vehicle hardware/ software development, provides payload-processing accommodations, and manages the launch campaign/countdown.

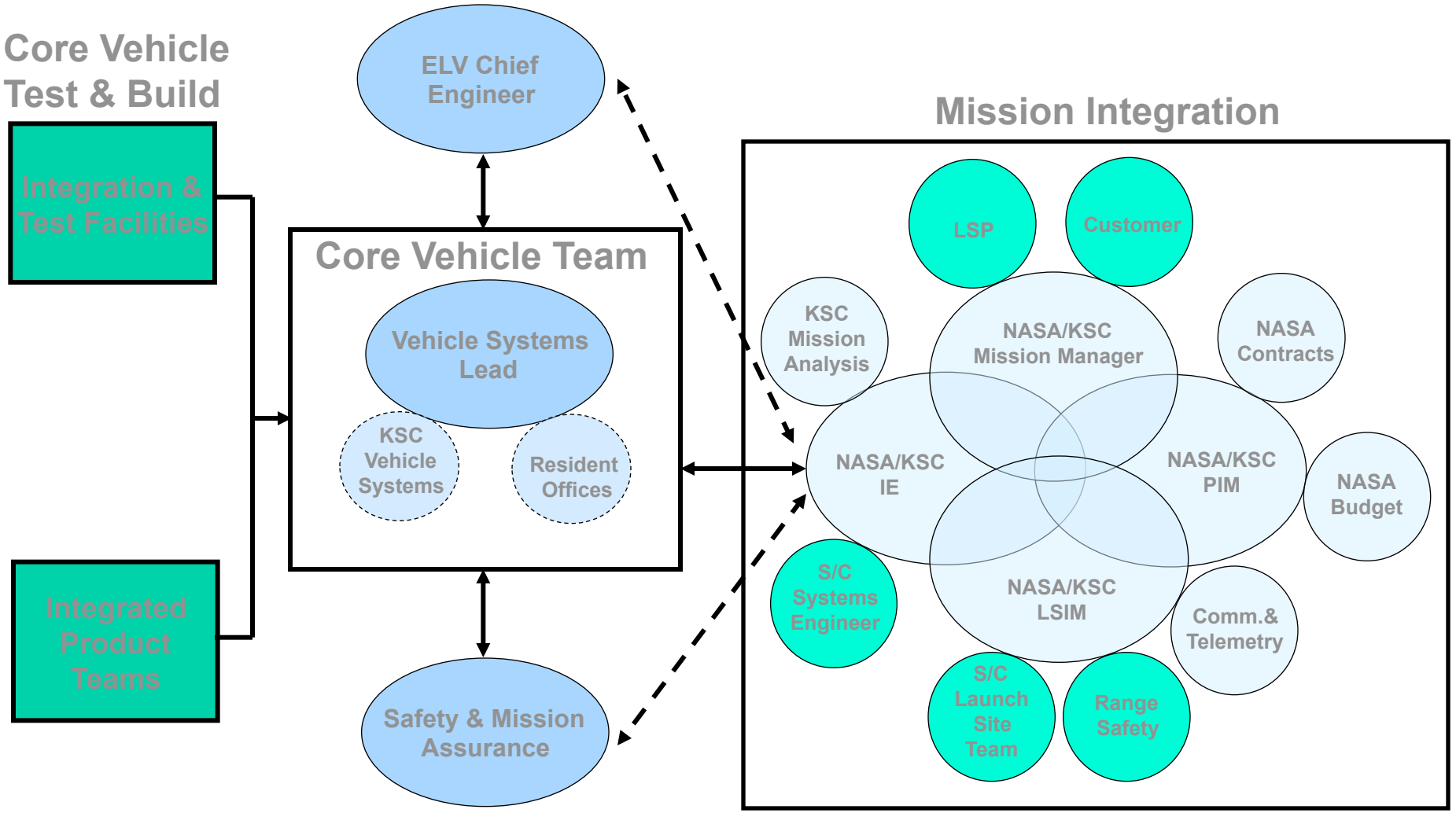
LSP Functional Structure

- 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 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
    - » Big stick – no-go for launch
- Interface with Safety and Mission Assurance
  - Safety
  - Quality

Technical Information flow into the MIT

John F. Kennedy Space Center

LAUNCH SERVICES PROGRAM



AO Requirements

Section 5.9.2 of the Explorer AO lists 3 requirements applicable to Launch Services. (Requirements 78-80)

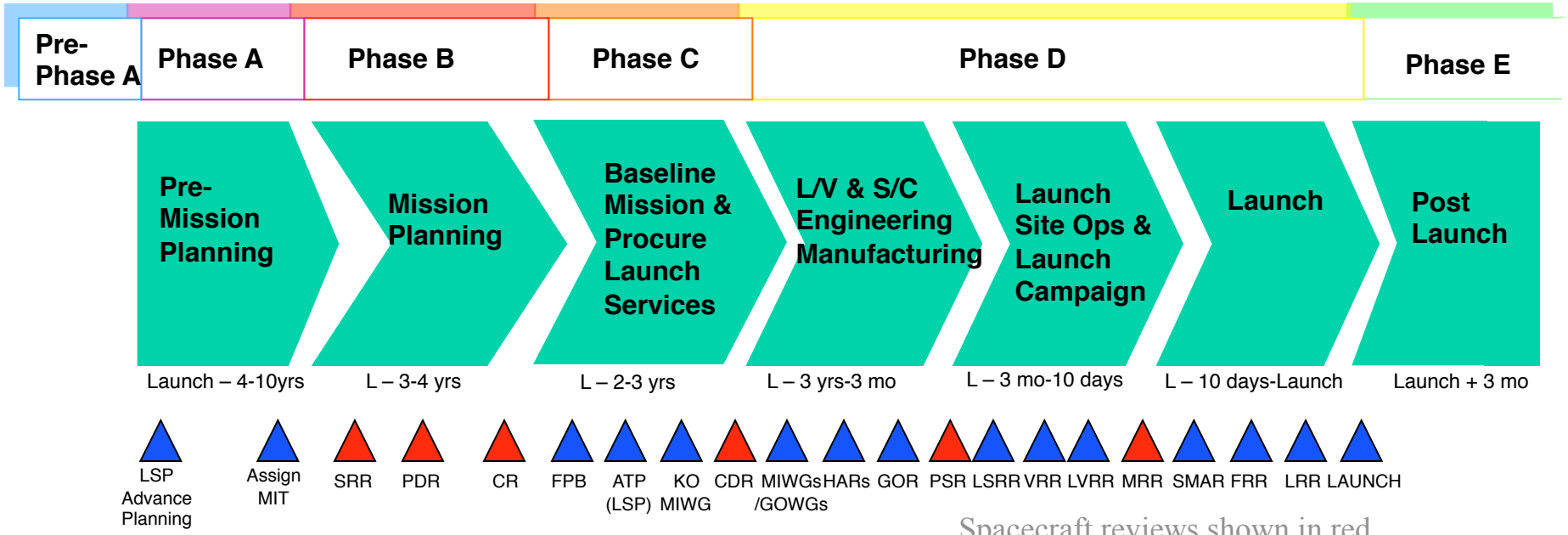
Requirement 78. Proposals shall define the required launch vehicle capability and demonstrate that it is compatible with the standard launch services offered

Requirement 79. If services beyond the standard launch services offered are required, the proposal shall include the cost of such services in the PI-Managed Mission Cost.

Requirement 80. Proposals shall discuss flexibility to be accommodated on multiple launch vehicle families

Ground Rules

- Any acquisition of a non-contributed 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 (NLS) contract.
- The LSP will competitively select a launch service provider for these missions based on customer requirements and NASA Flight Planning Board (FPB) approval.



Spacecraft reviews shown in red.

Available Vehicles

- Assumption of a specific launch vehicle configuration as part of this AO proposal will not guarantee that the proposed LV configuration will be selected for award of a launch service competitive procurement
  - Firm technical rationale for sole source justification is required in the proposal, and NASA would have to obtain appropriate approvals.
- The Agency policy, NPD 8610.7, “Risk Mitigation Policy for NASA-Owned and/or NASA-Sponsored Payloads/Mission” has been modified so newer launch service providers are eligible earlier to compete for any of NASA’s missions.

Available Vehicles - Continued

- Most likely candidate vehicles for Explorers AO that are available on the NLS I contract are
  - Pegasus XL
  - Falcon 1
  - Taurus XL
  - Others are available…just larger…
- Bidders must remain compatible with vehicles that provide their performance requirements
- The Follow-On to NLS I will be released by summers end, NLS II may have additional LV to be be considered

Launch Service Budget

- With the exception of the options noted in the next chart, the launch services cost will be held by the Explorers Program.
- The launch service includes:
  - The launch vehicle, engineering, analysis, and minimum performance standards and services provided by the contract.
  - Launch Site 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, a GN2 or pure air purge prior to T-0 and 10,000 Class integration environment.
  - Budget does not include launch delays.

Option Costs

ELV Launch Services Class Option A:						
Additional Options	**Launch Date**	**FY14**	**FY15**	**FY16**	**FY17**	**Total ($M)**
Kwajalein Launch Site	12/16	4.5	8.2	6.9	1.7	21.3
Eastern Launch Site	12/16	1.8	3.2	2	0.7	7.7
Wallops Launch Site	12/16	2	3.7	2.8	0.8	9.3
Additional Options	**Launch Date**	**FY15**	**FY16**	**FY17**	**FY18**	**Total ($M)**
Kwajalein Launch Site	12/17	4.7	8.7	7.3	1.7	22.4
Eastern Launch Site	12/17	1.8	3.4	2.1	0.7	8
Wallops Launch Site	12/17	2.1	3.9	3	0.8	9.8
Additional Options	**Launch Date NLT**	**FY16**	**FY17**	**FY18**	**FY19**	**Total ($M)**
Kwajalein Launch Site	12/18	4.9	9	7.6	1.9	23.4
Eastern Launch Site	12/18	2	3.6	2.3	0.7	8.6
Wallops Launch Site	12/18	2.3	4.2	3.1	0.9	10.5

Option Costs

ELV Launch Services Class Option B:						
Additional Options	**Launch Date**	**FY14**	**FY15**	**FY16**	**FY17**	**Total ($M)**
Kwajalein Launch Site	12/16	1.5	2.9	2.9	0.6	7.9
Eastern Launch Site	12/16	0.4	0.8	0.2	0.2	1.6
Wallops Launch Site	12/16	1.1	2.1	1.5	0.4	5.1
Supplemental Propulsion	12/16	2.5	2.5			5.0
Additional Options	**Launch Date**	**FY15**	**FY16**	**FY17**	**FY18**	**Total ($M)**
Kwajalein Launch Site	12/17	1.6	3	3.1	0.6	8.3
Eastern Launch Site	12/17	0.5	0.9	0.2	0.2	1.8
Wallops Launch Site	12/17	1.2	2.2	1.6	0.4	5.4
Supplemental Propulsion	12/17	2.6	2.6			5.2
Additional Options	**Launch Date NLT**	**FY16**	**FY17**	**FY18**	**FY19**	**Total ($M)**
Kwajalein Launch Site	12/18	1.7	3.2	3.2	0.7	8.8
Eastern Launch Site	12/18	0.5	0.9	0.2	0.2	1.8
Wallops Launch Site	12/18	1.2	2.3	1.7	0.5	5.7
Supplemental Propulsion	12/18	2.8	2.8			5.6

Performance by Launch Site
Option A

Range	Assumed Inclination - Degrees	Altitude Range km	Performance Range kg
Eastern (Cape Canaveral Air Force Station, CCAFS)	28.5	200 - 1400	120 – 1585
Western (Vandenberg Air Force Base, VAFB)	Sun-Synchronous	200 - 1100	120 - 1155
Wallops Flight Facility, WFF	45	200 - 1300	130 - 1435
Kwajalein (Reagan Test Site, RTS)	9 - 10	200 - 1400	210 - 1555

- This performance does not include the effects of orbital debris compliance, which must be evaluated on a mission-specific basis. This could result in a significant performance impact for missions in which launch vehicle hardware remains in Earth orbit.
- Guidance reserves account for 3-sigma flight performance.
- Performance is for baseline configuration; non-standard, mission-unique hardware will require additional assessment.
- 38-inch (0.96-meter) separation system.
- Mass of entire separation system is book-kept on the launch vehicle side.
- Listed performance is for separated spacecraft mass.

Performance by Launch Site
Option B

Range	Assumed Inclination - Degrees	Altitude Range km	Performance Range kg
Eastern (Cape Canaveral Air Force Station, CCAFS)	28.5	200 - 1400	120 – 450
Western (Vandenberg Air Force Base, VAFB)	Sun-Synchronous	200 - 1100	120 - 325
Wallops Flight Facility, WFF	45	200 - 1300	130 - 425
Kwajalein (Reagan Test Site, RTS)	9 - 10	200 - 1300	115 - 395

- This performance does not include the effects of orbital debris compliance, which must be evaluated on a mission-specific basis. This could result in a significant performance impact for missions in which launch vehicle hardware remains in Earth orbit.
- Guidance reserves account for 3-sigma flight performance.
- Performance is for baseline configuration; non-standard, mission-unique hardware will require additional assessment.
- 38-inch (0.96-meter) separation system.
- Mass of entire separation system is book-kept on the launch vehicle side.
- Listed performance is for separated spacecraft mass.

Performance by Launch Site
Option B Supplemental Propulsion

Performance with supplemental propulsion system:

The primary purpose of the a supplement propulsion system is to achieve smaller injection errors, however this system will generally provide for a performance benefit when considering altitudes above 600 km

Range	Assumed Inclination - Degrees	Altitude Range km	Performance Range kg
Eastern (Cape Canaveral Air Force Station, CCAFS)	28.5	200 - 1400	175 – 360
Western (Vandenberg Air Force Base, VAFB)	Sun-Synchronous	200 - 1100	115 - 250
Wallops Flight Facility, WFF	45	200 - 1300	160 - 335
Kwajalein (Reagan Test Site, RTS)	9 - 10	200 - 1300	150 - 315

- This performance does not include the effects of orbital debris compliance, which must be evaluated on a mission-specific basis. This could result in a significant performance impact for missions in which launch vehicle hardware remains in Earth orbit.
- Guidance reserves account for 3-sigma flight performance.
- Performance is for baseline configuration; non-standard, mission-unique hardware will require additional assessment.
- 38-inch (0.96-meter) separation system.
- Mass of entire separation system is book-kept on the launch vehicle side.
- Listed performance is for separated spacecraft mass.

Static and Dynamic Envelopes
Option A

Static Payload Envelope:

Launch Vehicle Station	Length forward of Payload Separation System forward face		Diameter		Comments
(in)	(in)	(cm)	(in)	(cm)	
5.1	0.0	0.0	52.3	132.8	Plane of the payload separation system forward face (Nominal payload diameter)
110.0	104.9	266.4	45.0	114.3	Conical section (up to LV Sta. 135.0)
160.0	154.9	393.4	27.3	69.3	Diameter at maximum payload length

Revision -, 04 Dec 2009

Note: LV station 0.0 (in inches) is at the base of the payload cone interface flange.

Dynamic Payload Envelope:

Launch Vehicle Station	Length forward of Payload Separation System forward face		Diameter		Comments
(in)	(in)	(cm)	(in)	(cm)	
5.1	0.0	0.0	55.3	140.5	Plane of the payload separation system forward face (Nominal payload diameter)
110.0	104.9	266.4	48.0	121.9	Conical section (up to LV Sta. 135.0)
160.0	154.9	393.4	30.3	77.0	Diameter at maximum payload length

Revision -, 04 Dec 2009

Note: LV station 0.0 (in inches) is at the base of the payload cone interface flange.

Static and Dynamic Envelopes
Option B

Static Payload Envelope:

Launch Vehicle Station		Length forward of Payload Separation System forward face		Diameter		Comments
(in)	(cm)	(in)	(cm)	(in)	(cm)	
584.80	1485.4	0.00	0.0	45.82	116.4	Plane of the payload separation system forward face
604.80	1536.2	20.00	50.8	45.40	115.3	Nominal payload diameter
628.50	1596.4	43.70	111.0	44.90	114.1	Ogive Mate Line
669.00	1699.3	84.20	213.9	27.90	70.9	Diameter at maximum payload length

Dynamic Payload Envelope:

Launch Vehicle Station		Length forward of Payload Separation System forward face		Diameter		Comments
(in)	(cm)	(in)	(cm)	(in)	(cm)	
584.80	1485.4	0.00	0.0	46.42	117.9	Plane of the payload separation system forward face
604.80	1536.2	20.00	50.8	46.00	116.8	Nominal payload diameter
628.50	1596.4	43.70	111.0	45.50	115.6	Ogive Mate Line
669.00	1699.3	84.20	213.9	28.60	72.6	Diameter at maximum payload length

Note: Launch vehicle station reference is a point in space 18.50 in (47.0 cm) aft of the stage 1 nozzle exit plane.

Static and Dynamic Envelopes
Option B with supplemental propulsion

Static Payload Envelope:

Launch Vehicle Station		Length forward of Payload Separation System forward face		Diameter		Comments
(in)	(cm)	(in)	(cm)	(in)	(cm)	
595.25	1511.9	0.00	0.0	45.60	115.8	Plane of the payload separation system forward face
604.80	1536.2	9.55	24.3	45.40	115.3	Nominal payload diameter
628.50	1596.4	33.25	84.5	44.90	114.1	Ogive Mate Line
669.00	1699.3	73.75	187.3	27.90	70.9	Diameter at maximum payload length

Dynamic Payload Envelope:

Launch Vehicle Station		Length forward of Payload Separation System forward face		Diameter		Comments
(in)	(cm)	(in)	(cm)	(in)	(cm)	
595.25	1511.9	0.00	0.0	45.60	115.8	Plane of the payload separation system forward face
604.80	1536.2	9.55	24.3	45.40	115.3	Nominal payload diameter
628.50	1596.4	33.25	84.5	44.90	114.1	Ogive Mate Line
669.00	1699.3	73.75	187.3	27.90	70.9	Diameter at maximum payload length

Note: Launch vehicle station reference is a point in space 18.50 in (47.0 cm) aft of the stage 1 nozzle exit plane.

Summary

- 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 barbara.giles@nasa.gov; LSP will gladly respond as quickly as possible.