# *NASA ELV Launch Services*

## MIDEX Phase A Kick-off Meeting
## May 16,2001

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**NASA/KSC ELV Launch Services**
**Mission Management Office**

# Launch Services Highlights for Phase A



- **Due to on-going discussions with Boeing, the Delta II 7420 and 7425 are the only Delta II available for these missions**
  - **If other configuration is needed, contact KSC.**
- **Taurus is still available**
- **The cost figures have changed**
  - **Totals have not changed much, but phasing is different**
- **If launch date is not within the same month as assumed in the given figures, then contact KSC for revised figures.**
- **For de-escalating figures into earlier FY, use the factors given in the AO cost guidelines.**
- **FYI – KSC assumptions for payload processing facilities has changed – was Government facility, now assumes commercial facility – not an issue for Phase A**

# Other considerations for Phase A

- Try to design to existing LV capabilities – mission unique modifications get expense very quickly
- Access tower for Taurus does not exist, but concept has been assessed and associate cost has been estimated – not trivial
- Delta II Dual Payload Attach Fitting has not been accounted for in the estimated costs – if being considered, contact KSC to discuss
- Helpful Web sites:
  - KSC ELV Performance Web Site: http://elvperf.ksc.nasa.gov
  - KSC ELV Payload Planner's Guide: http://elvppg.ksc.nasa.gov

# Launch Services Cost Figures



## Launch Date: March 2007
## Launch Site: VAFB (West Coast)

| Launch Service | FY'03 | FY'04 | FY'05 | FY'06 | FY'07 | Total |
|---|---|---|---|---|---|---|
| Taurus | 1 | 7 | 20 | 12 | 7 | 47 |
| Delta II 2420 | 1 | 11 | 23 | 22 | 12 | 69 |
| Delta II 2425 | 1 | 11 | 25 | 23 | 12 | 72 |

## Launch Site: CCAFS (East Coast)

| Launch Service | FY'03 | FY'04 | FY'05 | FY'06 | FY'07 | Total |
|---|---|---|---|---|---|---|
| Taurus | 1 | 7 | 21 | 12 | 7 | 48 |
| Delta II 2420 | 1 | 11 | 22 | 21 | 10 | 65 |
| Delta II 2425 | 1 | 11 | 24 | 22 | 10 | 68 |

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# Delta II Integration Schedule
# Spacecraft Input Timelines

EXPENDABLE LAUNCH VEHICLES

| Integration Products | Input required from Spacecraft Team | Input from Spacecraft Team Due: |
|---|---|---|
| ICD/Mission Specification/Verification Matrix …… | Interface Reqmts Document (IRD) | ATP (L-27mo) |
| **Loads Analyses** | | |
| • Spacecraft Environmental Testing Plans…… | Testing Plans | Test-9 weeks |
| • Spacecraft Test Data Summary…….. | Test Data or Report (if available) | Test Completion + 4 week |
| • Preliminary Design Loads Cycle (PDLC)…… | PDR Pre-Test Spacecraft Dynamic/FEM Model | ATP (L-27mo) |
| • Final Design Loads Cycle (FDLC) …… | CDR Pre-Test Spacecraft Dynamic/FEM Model and Mass Prop Report | L-78 weeks |
| • Verification Loads Cycle (VLC) …… | Test-verified (correlated) Spacecraft Model and Mass Prop Report | L-38 weeks |
| **Trajectory/Performance Analyses** | | |
| • Trajectory Feasibility Analysis (TFA)…… | Best avail mission reqmts (e.g., S/C mass, orbit, tracking) | ATP (L-27mo.) |
| • Preliminary Mission Analysis (PMA)…… | Updated mission reqmts and Mass Prop Report | L-66 weeks |
| • Detailed Test Objectives (DTO)…… | Updated mission reqmts w/ L-windows and Mass Props | L-39 weeks |
| • Final Mission Analysis (FMA)…….. | Final mission reqmts including L-windows | L-5 weeks |
| • Final Mass Properties Report…… | Final Mass Properties Report | L-5 weeks |
| **Other Engineering/Analyses** | | |
| • Payload Compatibility Drawing (preliminary)…….. | PDR drawings and Fairing Requirements | L-99 weeks |
| • Payload Compatibility Drawing (final)…….. | Final drawings | L-78 weeks |
| • Spacecraft Separation Analysis (initial) …… | Initial Nutation Time Constant input | L-66 weeks |
| • Spacecraft Separation Analysis (Final) …… | Final Nutation Time Constant input | L-4 weeks |
| • Integrated Thermal Analysis (ITA)…… | Spacecraft Geometrical/Thermal mathematical models | L-38 weeks |
| • Payload Fairing Venting Analsysis…….. | Identify Spacecraft ventable/non-ventable volumes | L-26 weeks |
| • RF Compatibility Study …… | Input for RF application for radiating on-site | L-8 weeks |
| • Launch Vehicle Insignia (Project/NASA Logo) …… | Final drawings | L-43 weeks |
| • | | |

# Delta II Integration Schedule
# Spacecraft Input Timelines (continued)



| Integration Products | Input required from Spacecraft Team | Input from Spacecraft Team Due: |
|---|---|---|
| **Launch Site Related Documentation** | | |
| • Spacecraft Launch Site Test Plan ..... | Testing plans at launch site | L-34 weeks |
| • Spacecraft Integrated Test Procedures..... | Testing Requirements that include both SC and LV | L-20 weeks |
| • Spacecraft Launch Site Standalone Test Procedures ... | Standalone Test Procedures | L-18 weeks |
| • Spacecraft-to-Blockhouse wiring diagrams ..... | LV Flight Harness/Spacecraft GSE wiring requirements | L-78 weeks |
| • Launch Site Support Plan (LSSP) – KSC document ..... | Launch Site Support Requirements | L-60 weeks |
| **Range Safety Documentation - Spacecraft Missile System Prelaunch Safety Package (MSPSP)** | | |
| • Draft Spacecraft MSPSP ..... | EWR 127-1 requirements | PDR-45 days |
| • Preliminary Spacecraft MSPSP ..... | EWR 127-1 requirements | CDR-45 days |
| • Final Spacecraft MSPSP ..... | EWR 127-1 requirements | Spacecraft arrival -45 days |

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# Pegasus/Taurus Integration Schedule
# Spacecraft Input Timelines

EXPENDABLE LAUNCH VEHICLES

| Integration Products | Input required from Spacecraft Team | Input from Spacecraft Team Due: |
|---|---|---|
| ICD/Mission Specification/Verification Matrix ..... | Interface Reqmts Document (IRD) | ATP (L-23mo) |
| **Loads Analyses** | | |
| • Spacecraft Environmental Testing Plans..... | Testing Plans | Test-9 weeks |
| • Spacecraft Test Data Summary..... | Test Data or Report (if available) | Test Completion + 4 week |
| • Final Design Loads Cycle (FDLC) ..... | CDR Pre-Test Spacecraft Dynamic/FEM Model and Mass Properties Report | L-70 weeks |
| • Verification Loads Cycle (VLC) ..... | Test-verified (correlated) Spacecraft Model and Mass Properties Report | L-24 weeks |
| **Trajectory/Performance Analyses** | | |
| • Preliminary Mission Analysis (PMA)..... | Best avail mission reqmts (e.g., S/C mass, orbit, tracking) and Mass Prop Report | L-60 week |
| • Final Mission Analysis (FMA)..... | Final mission reqmts including L-windows and Mass Prop Report | L-26 weeks |
| • Final Mass Properties Report..... | Final Mass Properties Report | L-26 weeks |
| **Other Engineering/Analyses** | | |
| • Mission Unique Hdwr Development (preliminary)..... | Spacecraft Mechanical/Elect Interface Drawings | ~L-90 weeks (PDR) |
| • Mission Unique Hdwr Development (final)..... | Update with CDR info | ~L-70 weeks (CDR) |
| • Spacecraft Separation Analysis (initial) ..... | Initial Nutation Time Constant input | L-60 weeks |
| • Spacecraft Separation Analysis (Final) ..... | Final Nutation Time Constant input | L-26 weeks |
| • Integrated Thermal Analysis (ITA)..... | Spacecraft Geometrical/Thermal mathematical models | L-60 weeks |
| • RF Compatibility Study ..... | Input for RF application for radiating on-site | L-8 weeks |
| • Launch Vehicle Insignia (Project/NASA Logo) ..... | Final drawings | L-43 weeks |
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# Pegasus/Taurus Integration Schedule
# Spacecraft Input Timelines (continued)

EXPENDABLE LAUNCH VEHICLES

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| • Spacecraft-to-Aircraft wiring diagrams ..... | LV Flight Harness/Spacecraft GSE wiring requirements | L-70 weeks |
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| • Draft Spacecraft MSPSP ..... | EWR 127-1 requirements | PDR-45 days |
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# LV Evaluation Checksheet

Proposal Name: _____

Proposal #: _____

Evaluator POC: _____

Phone: _____

Email: _____

**Technical Evalution:**

**Overall Assessment** – given the groundrules in the MIDEX AO, is the proposed LV concept feasible for this application?

☐ Yes ☐ No ☐ Yes with comments – see details below

**LV Performance:** ☐ Area of Concern

Proposed LV configuration: _____

Proposed Mass-to-Orbit Requirements:

Mass: ☐ kg Apogee: ☐ km Perigee: ☐ km Incl: ☐ deg

Does the proposed LV configuration have adequate performance capability? ☐ Yes ☐ No

If yes, how much performance margin is available? ☐ kg ☐ %

Comments/Issues/Concerns:

**LV-to-SC Interfaces:** ☐ Area of Concern

Payload Fairing Envelope – adequate envelope for proposed SC? ☐ Yes ☐ No ☐ Unclear

Proposed Mechanical Interface (LV/SC Adapter)?

☐ Standard Interface ☐ Custom Adapter Req'd ☐ Unclear

Mission Unique Modifications Required?

☐ Yes ☐ No ☐ Unclear

Comments/Issues/Concerns:

**LV Cost Assessment:** ☐ Area of Concern

Is LV cost profile consistent to that given in the AO LV Appendix?

☐ Yes ☐ No ☐ Unclear

If mission unique mods have been identified, have they been properly accounted for in cost profile?

☐ Yes ☐ No ☐ Unclear

Comments/Issues/Concerns:

# ELV Advance Mission Planning Support

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