

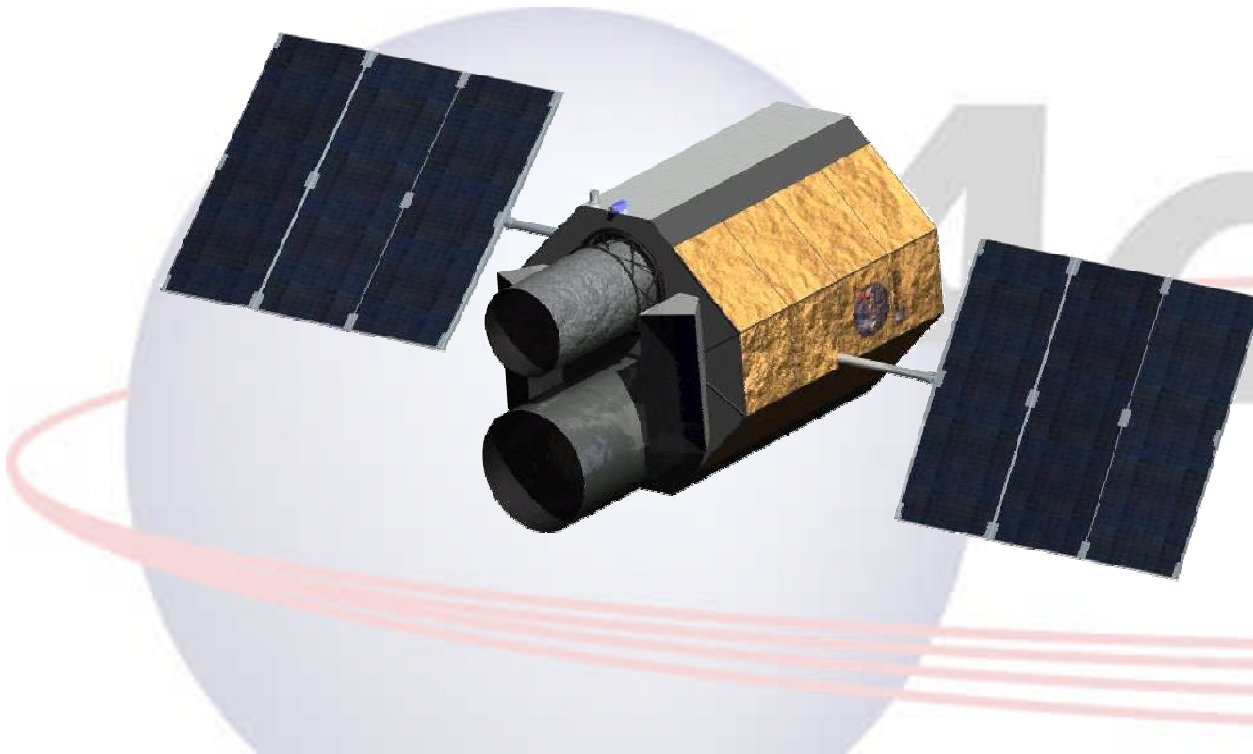


Xenia Spacecraft Study



Addendum: Spacecraft Cost Estimate

March 11, 2009





Spacecraft Cost



Cost: GR&A



- **1. All costs are in Fiscal Year (FY) 2009 dollars in millions based on NASA inflation tables.**
- **2. The estimate is accomplished using the NAFCOM (NASA/Air Force Cost Model) cost model**
- **3. System Test Hardware (STH) cost represents one equivalent unit, and all applicable system integration (wrap) costs represent the wrap costs for one test unit.**
- **4. All weight data is expressed in kilograms and represents dry weight only.**
- **5. Subsystem costs are limited to prime contractor incurred, exclusive of fee and those costs outside the scope of the prime contractor. Subcontractor effort, including fee in support of the prime contractor effort, is considered prime contractor incurred.**
- **6. Costs associated with the DDT&E effort encompass the period from the beginning of full scale development until the beginning of the build of the first flight article. Costs associated with the flight article are excluded from DDT&E.**



Cost: GR&A



- **7. Costs associated with the flight unit effort include the period beginning with the start of production initiated by long lead procurements and ending with the delivery of the first unit. Flight unit costs represent only the costs of the first unit to fly.**
- **8. All costs associated with mission operations and facilities are specifically excluded.**
- **9. Individual subsystem totals contain all hardware costs and engineering and manufacturing labor costs charged to that subsystem. These totals include all management, engineering, testing, and assembly functions, including the labor, materials, specific test equipment, and ground support equipment associated with the integration of the components or assemblies in the subsystem.**
- **10. Fee and Program Support, calculated at the element level, are set at 10 and 20% respectively.**



Cost: GR&A



- **11. Contingency, also calculated at the element level, is set at 20%, and vehicle integration, integration at the Cape, is set at 4%.**
- **Falcon 9 cost taken from: <http://www.spaceref.com/>**



Cost: Summary



Item	DDT&E	Flight Unit	Total
Subsystems	98.6	36.8	135.4
Structures/Mechanisms	35.1	7.6	42.7
Propulsion	6.7	3.2	9.9
Electrical Power & Distribution	18.3	8.2	26.5
Command & Data Handling	11.2	4.0	15.2
Communication	5.2	1.0	6.2
Attitude Control	11.7	8.9	20.6
Cabling	4.1	1.4	5.5
Thermal control	6.3	2.5	8.8
System Integration	51.4	15.9	67.3
Integration, Assembly and Checkout	9.1	7.4	16.5
System Test Operations	13.7		13.7
Ground Support Equipment	4.2		4.2
System Engineering & Integration	7.9	3.3	11.2
Program Management	13.3	5.2	18.5
Launch Operations & On-Orbit Support	3.2		3.2
Subsystems & Integration Total	150.0	52.7	202.7
Fee (10%)	15.0	5.3	20.3
Program Support (20%)	33.0	11.6	44.6
Contingency (20%)	39.6	13.9	53.5
Vehicle Integration (4%)	9.5		9.5
TOTAL Spacecraft	247.1	83.5	330.6
Falcon 9 (Vehicle & Services)			35
TOTAL Spacecraft & LV			365.6



Backup



Cost: NAFCOM Printout



NAFCOM Cost Model

WBS Cost Report 2009 \$M Risk Off

Estimate Name:

Prepared By:
Version:

WBS Element	DDT&E	D&D	STH	Flight Unit	Production	Total
Total Vehicle	247.1			83.6	83.6	330.8
Stage 1	247.1			83.6	83.6	330.8
Stage 1 Subsystems	98.6	74.4	24.3	36.9	36.9	135.6
Structures/Mechanisms	35.1	29.4	5.7	7.6	7.6	42.7
Propulsion	6.7	5.8	1.0	3.2	3.2	9.9
Electrical Power and Distribution	18.3	14.2	4.1	8.2	8.2	26.6
Command & Data Handling	11.2	5.9	5.3	4.0	4.0	15.2
Communications	5.2	3.9	1.3	1.0	1.0	6.2
Attitude Control	11.7	7.3	4.5	8.9	8.9	20.6
Cabling	4.1	2.9	1.1	1.5	1.5	5.6
Thermal Control	6.3	5.0	1.3	2.5	2.5	8.8
Stage 1 System Integration	51.4			15.9	15.9	67.3
Integration, Assembly and Checkout (IACO)	9.1			7.4	7.4	16.5
System Test Operations (STO)	13.7					13.7
Ground Support Equipment (GSE)	4.2					4.2
Tooling	0.4					0.4
ME/GSE	3.8					3.8
System Engineering & Integration (SE&&I)	7.9			3.3	3.3	11.2
Program Management	13.3			5.2	5.2	18.5
LOOS	3.2					3.2
Fee	15.0			5.3	5.3	20.3
Program Support	33.0			11.6	11.6	44.6

Shaded areas indicate thruput values

Wednesday, March 11, 2009

C:\Program Files\NAFCOMv2007\Xenia Est 1.xls

Page 1 of 2



Cost: NAFCOM Printout



Estimate Name:

Prepared By:
Version:

WBS Element	DDT&E	D&D	STH	Flight Unit	Production	Total
Contingency	39.6			13.9	13.9	53.5
Vehicle Level Integration	9.5			0.0	0.0	9.5

DDT&E (Design, Development, Test & Engineering)
 D&D (Design & Development)

DDT&E = D&D + STH
 Total = DDT&E + Production