EELV Program Assessment

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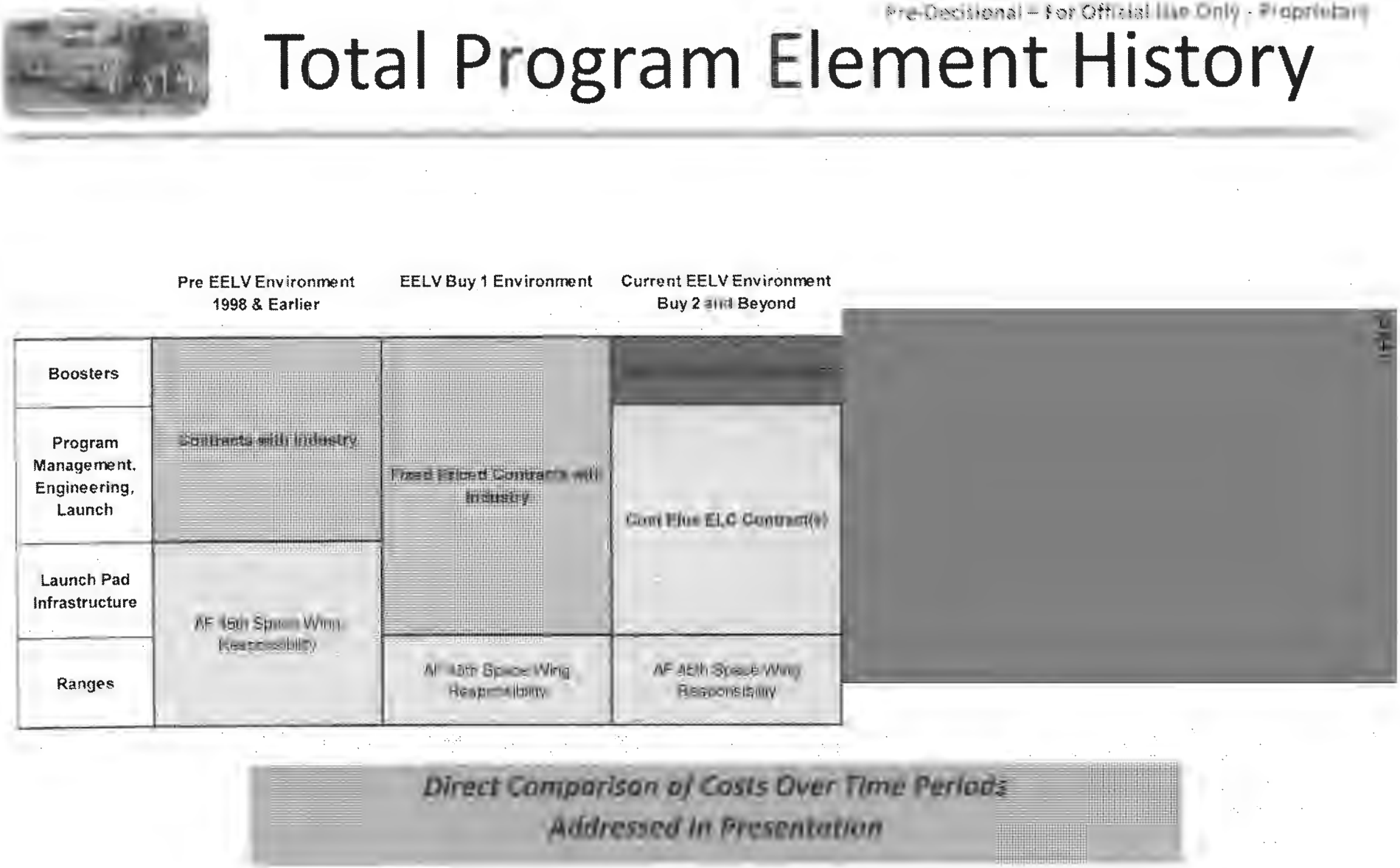
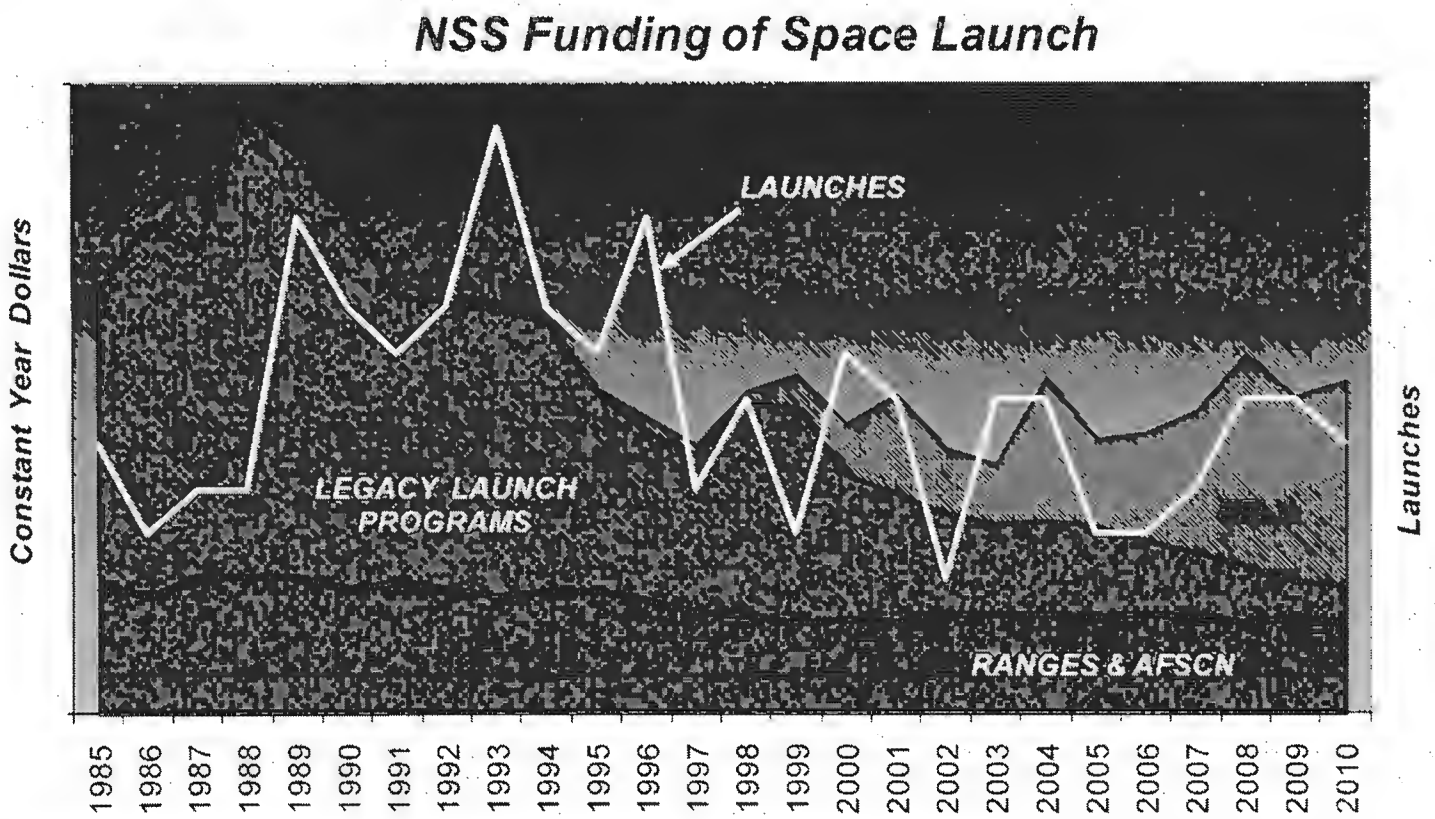
1. Historical Perspective

Total Program Element History



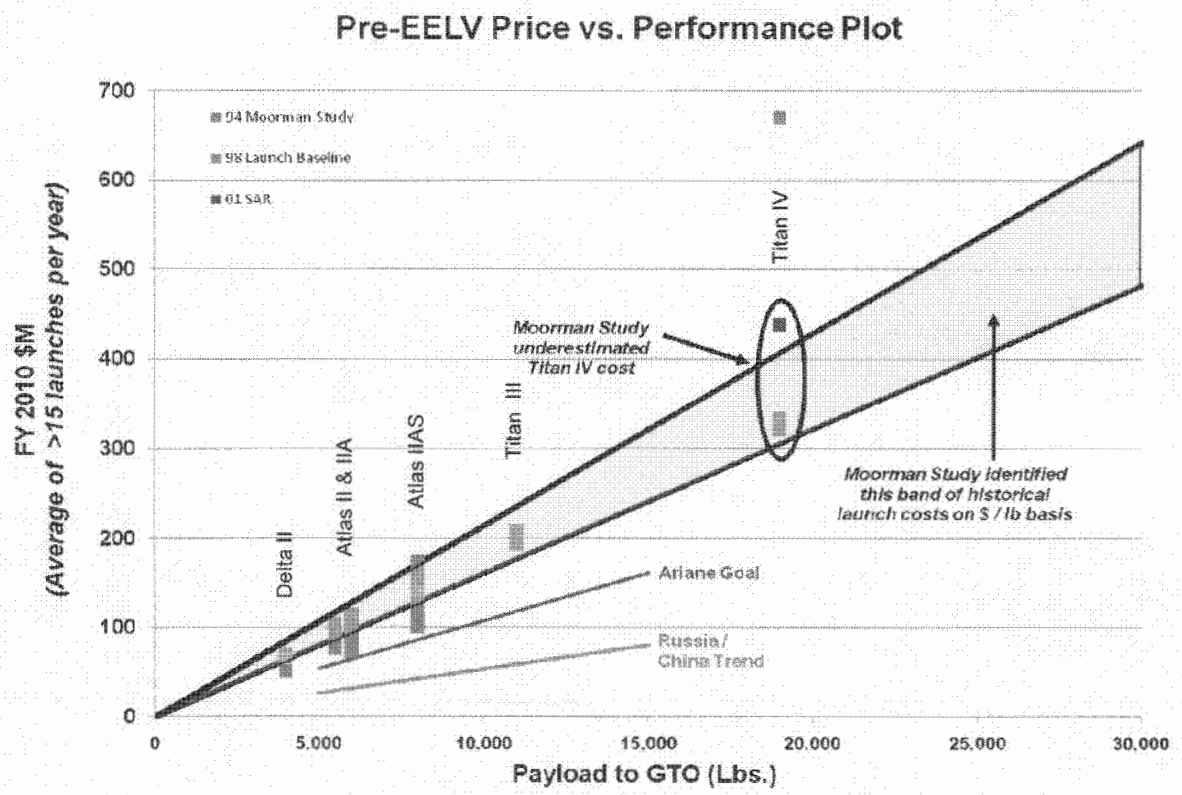
Direct Comparison of Costs Over Time Periods Addressed in Presentation

NSS Historical Launch Investment and Yield



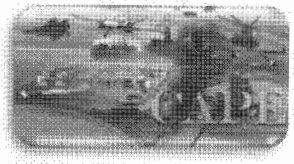
- *Current launch investment remains below legacy levels*
- *Within EELV, fixed infrastructure costs dominate*

1994 Moorman Study To EELV



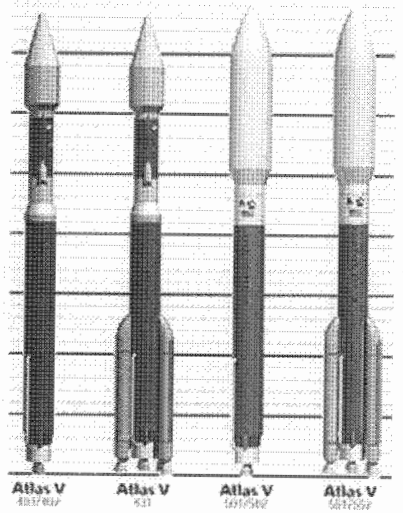
This chart appeared in the 1994 Space Launch Modernization Plan (Moorman Study) and was originally from the DoD Space Launch Systems Bottoms Up Review. It has been adjusted to FY2010 constant dollars.

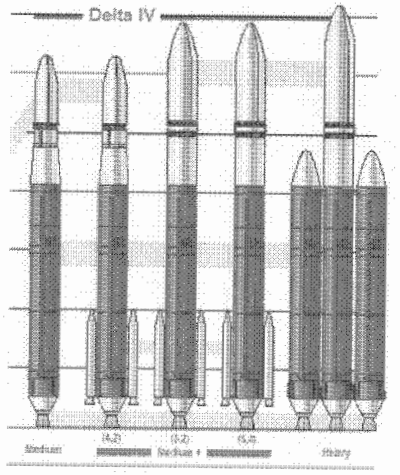
- ***1980-1994 : NSS averaged 8 launches per year + Non-NSS averaged 7.5 per year***
- ***1994 SLMP: recommends a single provider based on a modular (common core) family of vehicles as the most cost effective and reliable alternative to meeting the nation's expendable launch vehicle requirements***
- ***Dec 1996: EELV program Milestone I decision***
- ***Nov 1997: USD(A&T) approved new acquisition strategy to allow two providers to enter EMD / Initial Launch Services phase & to maintain competition throughout life of program based on a revised forecast of a significant increase in launch demand from commercial satellite providers***



EELV Suppliers

- Atlas V
  - Contract with United Launch Alliance
  - Lockheed Martin Heritage
  - Main Engine: RD-180 from RDA
    - RP-1 & Liquid Oxygen
  - Upper Stage: RL-10A from PWR
    - Liquid Hydrogen & Liquid Oxygen
  - Solid Rocket Motors from Aerojet
- Delta IV
  - Contract with United Launch Alliance
  - Boeing Heritage
  - Main Engine: RS-68 from PWR
    - Liquid Hydrogen & Liquid Oxygen
  - Upper Stage: RL-10B from PWR
    - Liquid Hydrogen & Liquid Oxygen
  - Solid Rocket Motors from ATK





EELV Initial Assumptions

- Extrapolating mid- 90's trends led to perception of market supporting two competitors; leading to a change of strategy
- Significant price advantage of large lot material buys
- 30 NSS orders in 5 years (2000-2004) (RFP was for 34 & Proposals were for 30)
- Large world-wide commercial demand; EELV would have a ~60% market share

Source: 1998 Commercial Space Transportation Advisory Committee and FAA Assoc Administrator for Commercial Space Transportation Reports

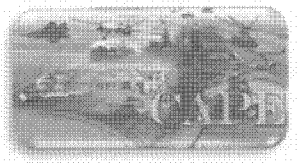
EELV Business Case

EELV Buy-1 Reality

- Lot buy provided material discounts
- RFP for 34 NSS missions, revised to 30 but only 28 awarded
- Only 13 of the 28 orders placed 2000-2004 and 3 launches 2002-2006
- Only 21 of the 28 Buy 1 orders were placed in 10 years
- Large commercial demand did not materialize and neither did EELV's market share projections

Sources: 1998 & 2009 FAA Commercial Space Transportation Forecasts

EELV Realized Business



Historical Buy 1 Booster Recurring Production Cost Break-out
(ELS component of cost)

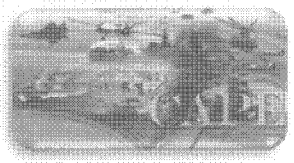
Design Related Factors are the Primary Driver to Cost Differences

2. OSD CA Estimated Future Resource Requirements

EELV Component of ULA

ULA is more than NSS EELV

OSD CA ELC Cost Estimate



Atlas V(4X1)* Recurring Production Labor ELS Component

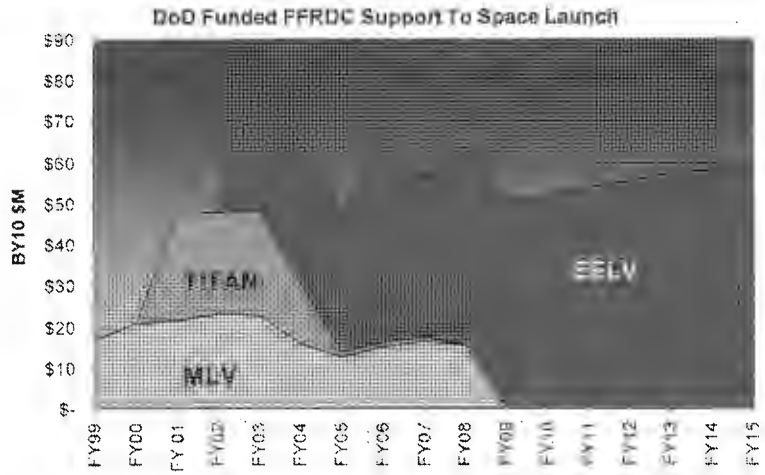
[redacted]

Major ULA Supplier Prices

OSD Cost Assessment EELV Estimate

OSD CA Estimate indicates prices have reverted to historical levels;
Slope has flattened and Delta IV Heavy price is considered a transient condition

Mission Assurance Costs



Sources: AF Congressional Briefings

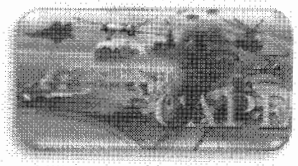
- EELV Mission Assurance funding to FFRDC ramp-up continues
- Mission Assurance is open ended by nature
  - Each problem identified can carry a permanent workload increase for both the contractor and the government office
  - Contractor has little incentive to disagree if they are compensated for additional workload
- Currently pay for 292 Aerospace FTE for National Security Space
  - Equates to 25% of ULA SEPM FTE & 11% of ULA Total NSS FTE

Challenge for leadership is identifying "How Much Is Enough?" and ensuring risks are retired appropriately

Technology Refresh

(b)(4)

- Key components perceived to be likely costs
  - Delta IV System Integration Lab – for hardware in loop testing ($30M)
  - Launch Infrastructure - facility and material upgrades to maintain launch system (~$35M / yr)
  - Ordnance - obsolete, discontinued material replacement (~$5M / yr)
  - Upper Stage Engine – rework inventory engines for mission assurance ($20M / yr for 3 yrs) + engine shelf life extension for inventory ($10M / yr for 2 yrs)
  - Avionics & Ground Computer System Upgrade – technology refresh of flight control system hardware at point where major upgrade to common architecture for Atlas and Delta vice piece part replacement for obsolesce is best path ($200M)
  - Upper Stage Engine Design Effort – not required for flight operation, this would be industrial design capability effort for new engine to replace 1950's design RL-10 ($350M) - NOT INCLUDED IN OSD CA ESTIMATE

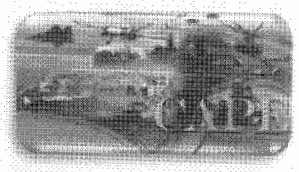


3. Compared projected with realizes cost savings of ULA

Budget Adjustments For ULA Savings

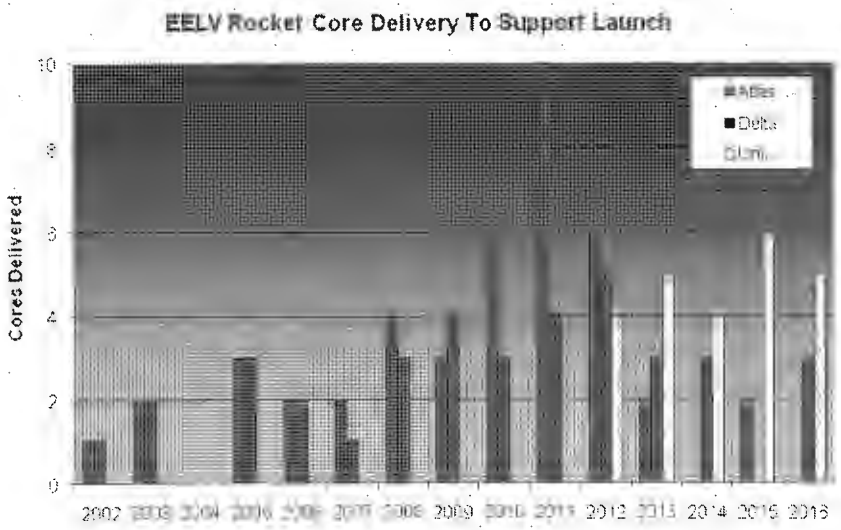
- *Restructuring Agreement allows for comparison of ULA to a Boeing / Lockheed Martin baseline*
- *Difference equates to savings and is attributed to all contracts*

– $150M AF budget reduction starting in FY11 assumes more savings than Restructure Agreement proposed and is applied against a 2010 baseline

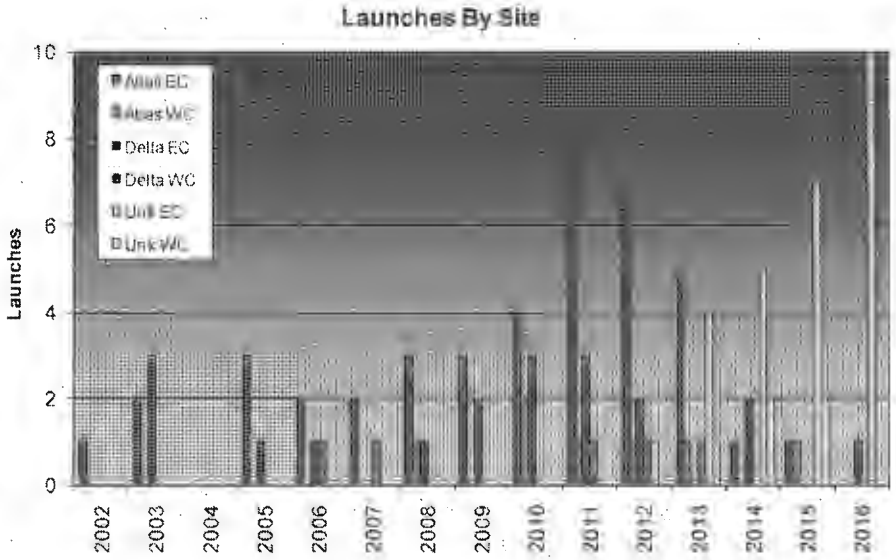


4. Assessing production and launch capability

Demand vs. Theoretical Capacity



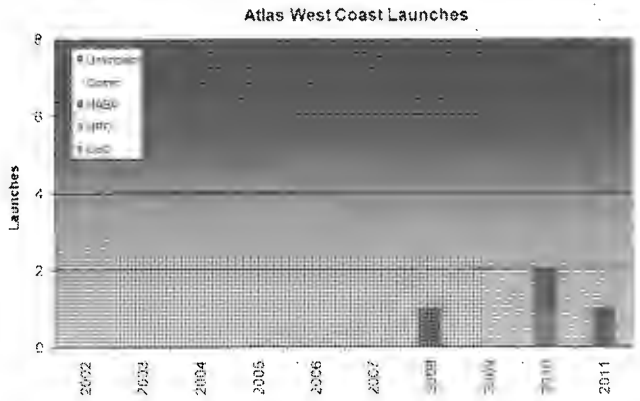
Capacity limit 10 / yr
for both Atlas V and Delta IV

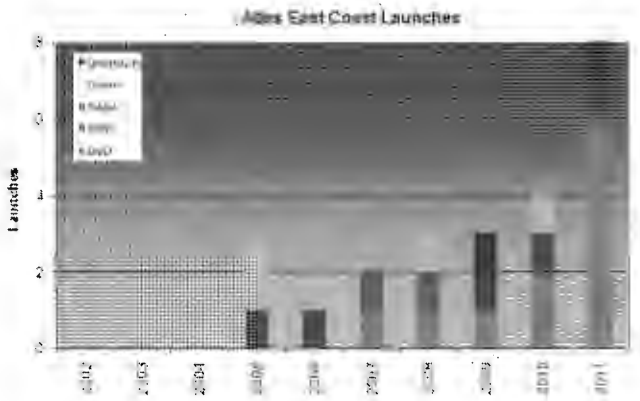


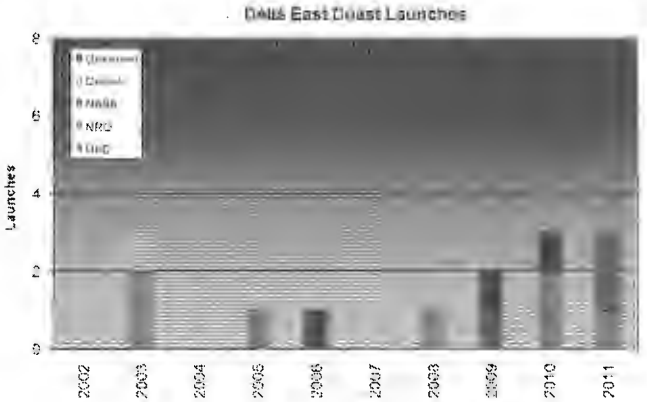
ELC funds 4 / yr each for Atlas V and Delta IV
Options exist to increase capability by either
increasing staffing and/or
balancing booster types and/or
balancing launch sites

Projected demand well within ULA theoretical production capacity

EELV Pad Usage

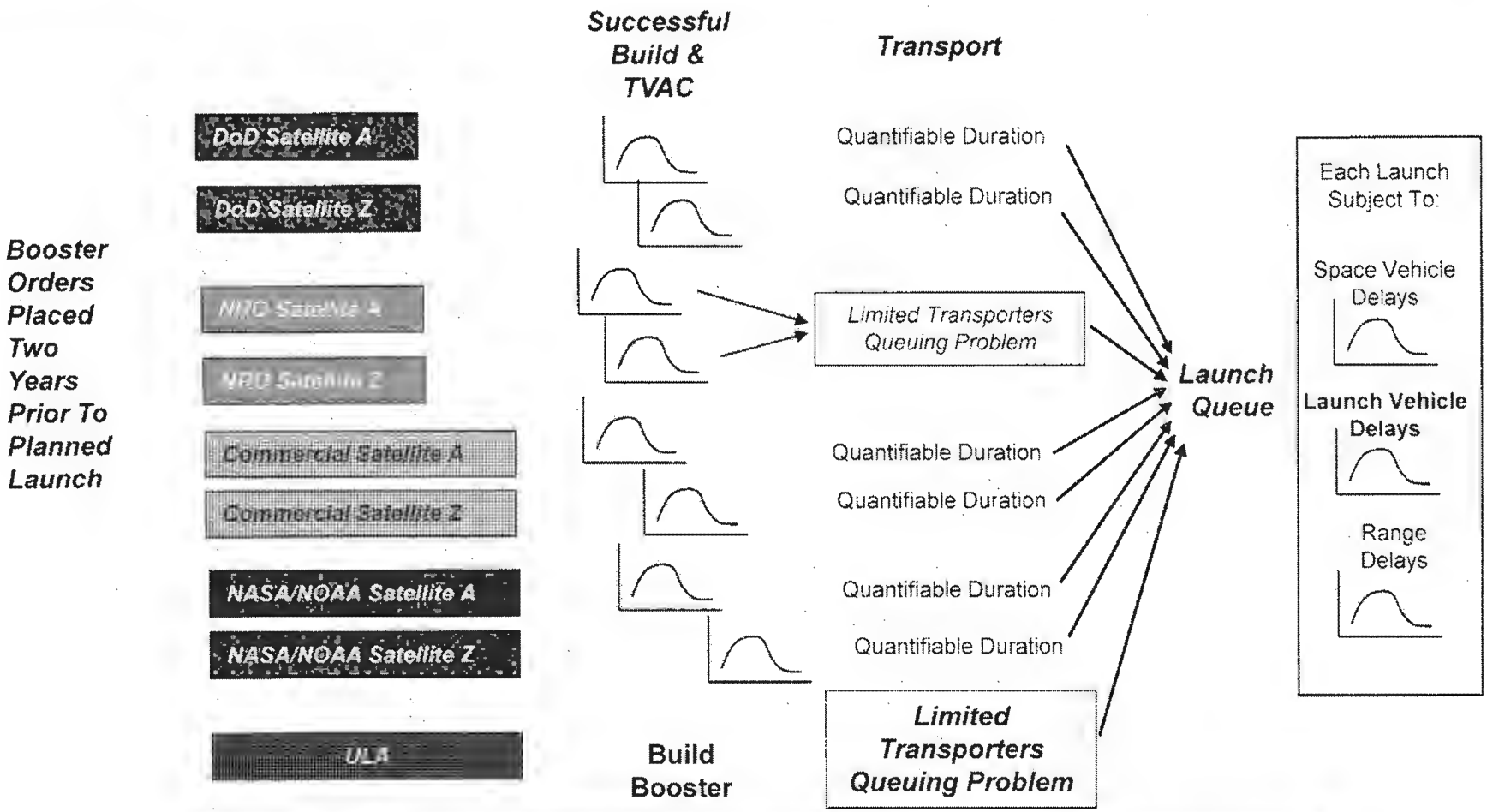




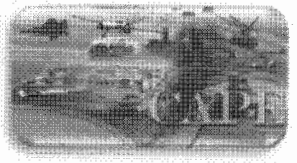


Challenging FY2010-11 Manifest: 12 Atlas launches planned @ CCAFS

Launch Yield – A Queuing Problem



Most Factors Beyond EELV Program Control
Developing Model with SPO and ULA Assistance

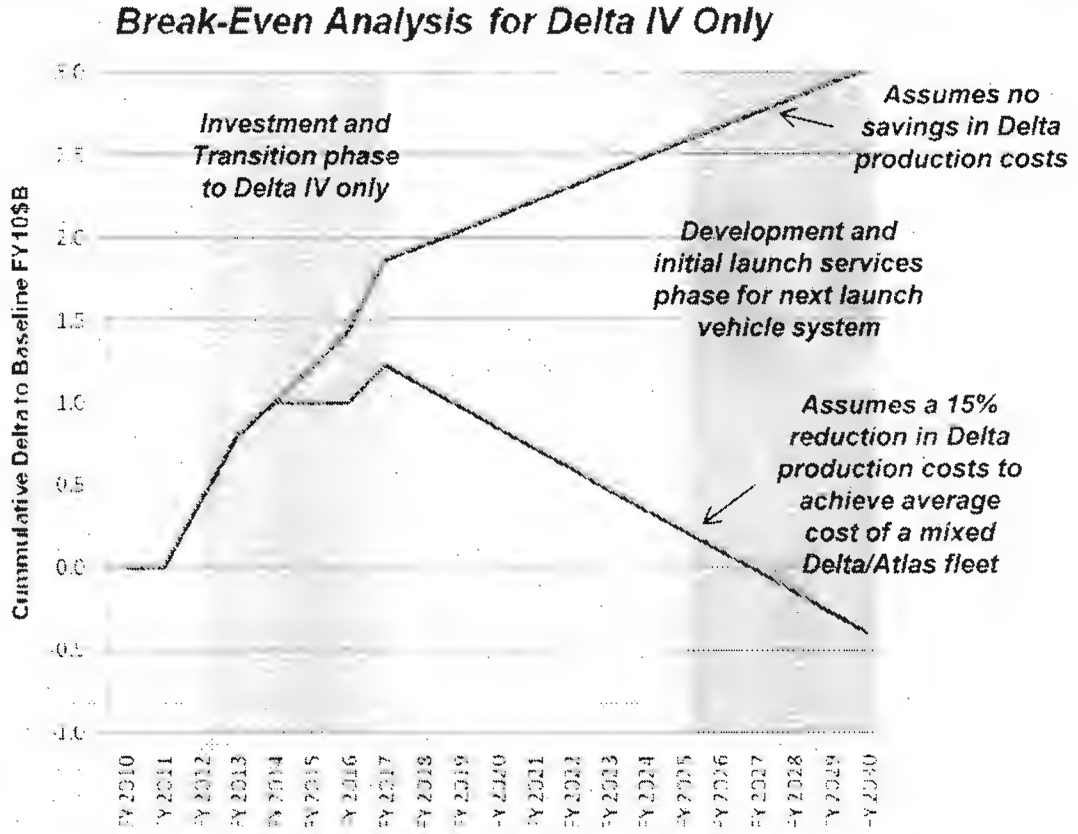


5. Evaluation of alternative acquisition strategies - TBD

Consolidate to Delta IV Only

Key Assumptions:

- $1B total investment in FY2012-14 for Delta IV launch infrastructure (2nd pad @ CCAFS)
- Last Atlas V buy in FY14 with planned launch in FY16 (hold pad available half of FY17)
- 26% reduction in ULA ELC staffing
- 6 booster purchases per year beyond FY15



Not likely to reach break-even point on additional infrastructure investment before a new launch vehicle replaces Delta IV

Future Considerations

- To truly understand cost drivers, need to quantify cost of requirements
  - Allocate ULA EELV heads and equipment to specific requirements
  - Price requirements for leadership to understand and make decisions on
    - Infrastructure and Fixed Price Components
    - On-going Mission Assurance Components
- Declining demand stressing industrial base
  - Lack of clarity on NASA path forward requires PWR to quote fixed priced engine contracts assuming no NASA work
  - "Buy 1" Contract lot buy allowed contractors to manage subcontracts
  - "Buy 3" Contract single order placement strategy:

- Efforts to provide realistic satellite readiness dates should improve yield

Without a significant policy change, significant cost reductions are unlikely

Launch Environment Summary

	Pre EELV Environment 1998 & Earlier	EELV Buy 1 Environment 1998 - 2010	Current EELV Environment 2011 & Beyond
Payload Requirement	4K - 20K Lbs to GTO	10K - 28K Lbs to GTO	
Boosters	Different Programs for Several Size Classes	One Program Based on Common Core	
Launch Pad Infrastructure	AF 45th Space Wing of Responsibility	Contractor Responsibility	
Orders	Lot Buys	Lot of 36	Single buys

[redacted]

Government oversight for Mission Assurance and role as the dominant customer has returned launch to the Pre-EELV scenario.

Therefore, a return to historical prices range should not be a surprise, but still below historical considering lower launch rates