

N93-26911

SPACE NUCLEAR THERMAL PROPULSION



**DOD REQUIREMENTS
FOR
SPACE NUCLEAR THERMAL PROPULSION**

PRESENTATION TO

**NUCLEAR PROPULSION TECHNICAL
INTERCHANGE MEETING**

BY

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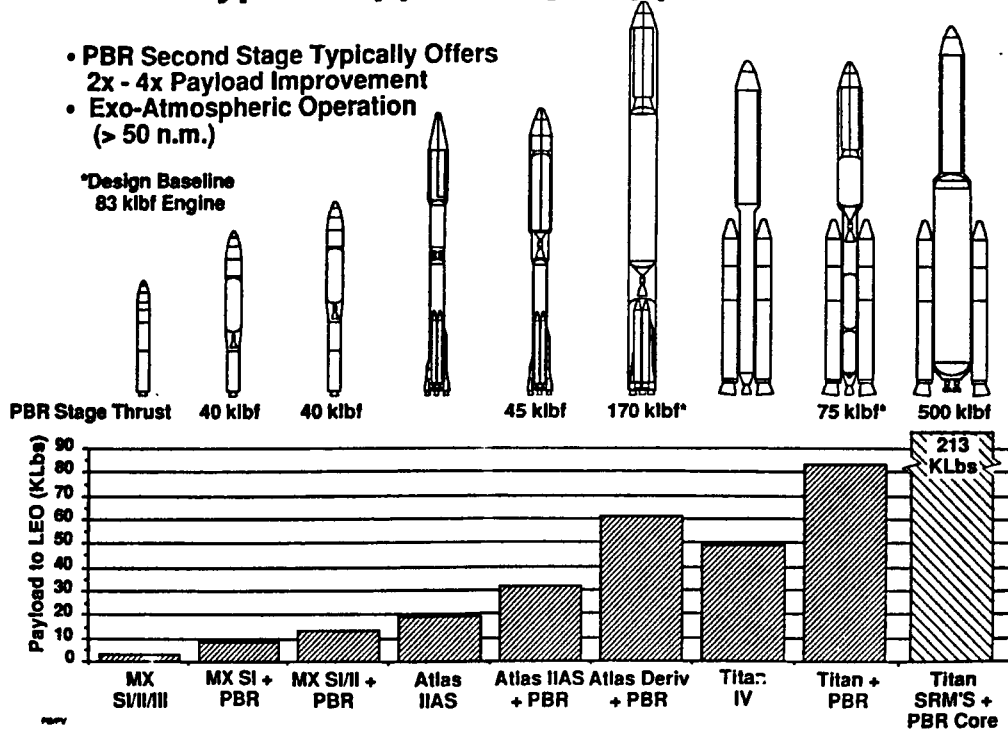
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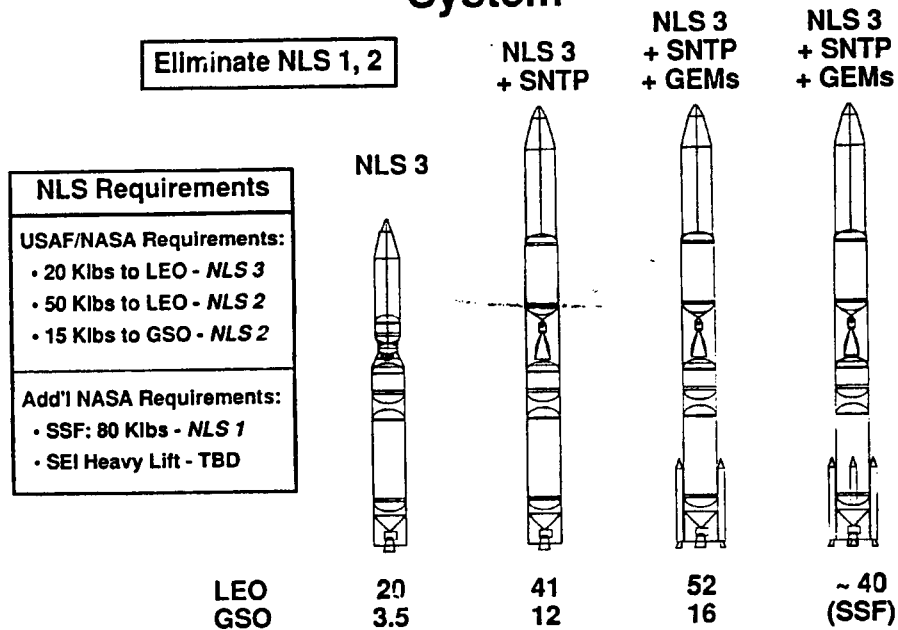
**POTENTIAL DOD APPLICATIONS
OF NUCLEAR THERMAL
PROPULSION**

- o UPPER STAGES ON EXISTING AND/OR
NEW LAUNCH SYSTEMS**
- o ORBIT TRANSFER VEHICLES (OTVs)**
- o REUSABLE OTVs**
- o ORBIT MANEUVERING VEHICLES**

Typical Upper Stage Applications



Complement National Launch System





DOD APPLICATIONS NO LONGER UNDER CONSIDERATION

- o **BALLISTIC MISSILE INTERCEPTOR SECOND STAGE**
- o **ICBM SECOND STAGE**



DOD/AIR FORCE NTP REQUIREMENTS

- o **DOD AND AIR FORCE DO NOT SPECIFICALLY CALL OUT NEED FOR NTP**
 - **CALL OUT MISSION REQUIREMENTS, NOT TECHNOLOGY**
 - **NTP COULD ENABLE MISSION ACCOMPLISHMENT (LAUNCH UPPER STAGE) AT LESS EXPENSE AND WITH GREATER RELIABILITY**

SNTP PERFORMANCE GOALS



SNTP HAS THE FOLLOWING PERFORMANCE GOALS IN DEVELOPING AN ENGINE TECHNOLOGY WITH TWICE THE SPECIFIC IMPULSE OF H₂/O₂ ENGINES WITH COMPARABLE THRUST TO WEIGHT

THRUST:	20,000 to 80,000 LBr
THRUST TO WEIGHT RATIO:	UP TO 35 TO 1
SPECIFIC IMPULSE, I_{sp}:	1,000 SEC
GAS CHAMBER TEMPERATURE:	3,000K
RUN TIME DURATION:	1,000 SEC
ENGINE CYCLES:	3 TO 10
ENGINE STARTUP TIME:	UNDER 10 SEC

Potential Cost Benefits

Assumed \$1000/Lb Launch Cost to LEO (Past Year 2000)

Mission	Impact of SNTP	\$/Mission <small>*Non-Recurring</small>	#/Year	20 Year Total	
National Launch System	Eliminate Large Core	\$25 M + \$2 B*	4	\$4.0 B	USAF \$19.4 B
Atlas Upgrade	Titan IV Payload Capability	\$130 M	4	\$10.4 B	
Orbital Maneuvering Vehicle	Retrieve/Repair High Value Satellites	\$500 M	1	\$5.0 B	