



Space Debris Mitigation Measures: United States Department of Defense

7 May 2009

**Major Michael W. Taylor
HQ AFSPC/JAI**

The views expressed in this presentation are those of the author and do not reflect the official policy or position of the United States Air Force, Department of Defense, or the U.S. Government. This briefing is for information only. No U.S. Government commitment to sell, loan, lease, co-develop or co-produce defense articles or provide defense services is implied or intended.



Overview

- **U.S. Government & DoD Policy**
- **Commercial and Foreign Entities (CFE) Program**



National Space Policy (2006)

- “Orbital debris poses a risk to continued reliable use of space-based services and operations and to the safety of persons and property in space and on Earth. The United States **shall seek to minimize the creation of orbital debris** by government and non-government operations in space in order to preserve the space environment for future generations.”
- “Departments and agencies **shall continue to follow the United States Government Orbital Debris Mitigation Standard Practices**, consistent with mission requirements and cost effectiveness”



Mitigation Standard Practices (1997)

UN Guideline

- **Planned releases of debris >5 mm on orbit >25 years require special evaluation and justification** **1**
- **Limit probability of accidental explosion through design and operation; deplete all on-board sources of stored energy when no longer required** **2, 5**
- **Limit probability of collision with all known objects during lifetime of spacecraft; limit probability that collisions with debris <1 cm will cause loss of control** **3**
- **Final disposal by atmospheric reentry, specified storage orbits, or direct retrieval** **6, 7**



DoD Space Policy

- **DoD Directive 3100.10, *Space Policy* (1999)**
 - **Minimize space debris consistent with National Space Policy**
 - **Disposal shall be planned for atmospheric reentry, storage orbit, or direct retrieval**
- **DoD Instruction 3100.12, *Space Support* (2000)**
 - **Reiterates national guidelines concerning mitigation and disposal**
 - **For nuclear power sources in orbit, requires environmental impact analysis (or nuclear safety evaluation) and high-level approval**



Practical Measures

- **DoD works closely with NASA**
- **Space Surveillance Network (SSN)**
- **Standing Rules of Engagement (SROE)**
- **Safety**
- **Environmental**
- **Contracting**
- **Commercial and Foreign Entities (CFE) Program**



CFE: Background

- **Congress created pilot program (10 USC § 2274) in 2004 to determine feasibility and desirability of providing space surveillance data support**
- **Authorizes Secretary of Defense to provide non-US Government entities (also called CFEs):**
 - **Satellite tracking services**
 - **Space surveillance data and analysis**
- **CFE user must sign agreement in which CFE agrees:**
 - **To pay, if charged by the Secretary**
 - **Not to transfer data or analysis without approval**
- **All authority delegated to Air Force Space Command**



CFE: Background

- **Statutory authority expires September 30, 2010**
 - Proposed legislation would make program permanent
 - Authority for program likely to shift to USSTRATCOM in October 2009
- **National Space Policy**
 - The Secretary of Defense “**shall conduct space situational awareness for: the United States Government; U.S. commercial space capabilities and services used for national and homeland security purposes; civil space capabilities and operations, particularly human space flight activities; and, as appropriate, commercial and foreign entities.**”



CFE: Pilot Program Goals

- **Consistent with National Space Policy:**
 - **Promote safe, responsible and peaceful use of space**
 - **Develop strategy, vision and approach to transform from space surveillance to space situation awareness (SSA)**
 - **Provide SSA and strengthen relationships**
 - **Enable shared SSA across commercial and foreign interests**



CFE: Current Services

- **Public website (www.space-track.org)**
 - **Valid user info and digital user agreement required**
 - **General orbital data provided (TLE, SATCAT, Decay)**
 - **Over 37,000 users**
- **CFE conjunction analysis (CA) and launch support services**
 - **Requires more detailed, signed agreement**
 - **Safety of flight information for conjunctions/close approaches**
 - **Case-by-case basis**
 - **Consistent with national security requirements and available resources**
 - **9 signed agreements with commercial users**



CFE: Range of Services

Minimum

- **Conjunction Assessment (DoD/Civil v. all)**
- **Basic Orbital Data**
- **Launch Support**



Maximum

- **Conjunction Assessment (all v. all)**
- **Collision Avoidance**
- **Space Threat Warning**
- **Space Environmental Data**
- **Fees or Quid Pro Quo**
- **Data Warehouse**
- **CFE Positional Data**
- **CFE State of Health**
- **Space Object Identification**
- **Anomaly resolution**



CFE: Debris Mitigation

- **CFE Program enhances SSA**
- **Better SSA = improved safety of flight**
 - **Less chance of collision in space**
 - **Helps identify sources of anomalies**
 - **Better assessment of effectiveness of international and national debris mitigation measures**
- **Outside scope of CFE program:**
 - **Intra-U.S. Government**
 - **Certain limited emergency situations**



Contact Information:

Major Michael W. Taylor
HQ AFSPC/JAI
150 Vandenberg St, Ste 1105
Peterson AFB CO 80914-4320

(719) 554-5494
michael.taylor@peterson.af.mil