The University of Mississippi School of Law

The National Center for Remote Sensing, Air, and Space Law

Informational resources on the legal aspects of human activities using aerospace technologies

USA-193: Selected Documents

Compiled by P.J. Blount
P.J. Blount, editor
Joanne Irene Gabrynowicz, editor

Special Topics in Aerospace Law Series, No. 1

A Supplement to the Journal of Space Law

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National Center for Remote Sensing, Air, and Space Law

Founded in 1999, the National Center for Remote Sensing, Air, and Space Law is a reliable source for creating, gathering, and disseminating objective and timely remote sensing, space, and aviation legal research and materials. The Center serves the public good and the aerospace industry by addressing and conducting education and outreach activities related to the legal aspects of aerospace technologies to human activities.

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USA-193: Selected Documents

Foreword

by

Joanne Irene Gabrynowicz

The National Center for Remote Sensing, Air and Space Law at the University of Mississippi School of Law (Center) is pleased to make available *USA-193: Selected Documents*. This is the first in a new occasional series, *Special Topics in Aerospace Law*. The series is being offered as a supplement to the Center's primary publication, the JOURNAL OF SPACE LAW. The JOURNAL OF SPACE LAW is the world's oldest law review dedicated to space law and is available online through HeinOnLine. *USA-193: Selected Documents* is a compilation of the major documents that were generated by the shooting down of the satellite *USA-193* on 20 February 2008, and is being released on the first anniversary of the event.

USA-193 is, itself, an event with critical implications for space law. It is also one in a series of events that, collectively, are raising important, practical space law issues. These events include the reported Chinese ASAT test conducted against the Chinese *Fengyuan 1C* polar-orbiting weather satellite on 11 January 2007 and the on-orbit collision of the *Iridium - 33* and *Cosmos 2251* satellites on 10 February 2009. The latter event is the first known occurrence of two *bona fide* space objects from different Nation-States colliding into one another in open space. Among some of the issues raised by all of these events are determining liability for harm caused in space, in air, and on Earth; causing harm to the space environment; and, the obligation to inform or warn. Some of the most important issues specifically raised by the *USA–193* event emerge from Art. IX of the Outer Space Treaty and include how to define "peaceful purposes" and "potentially harmful interference" as well as what constitutes "appropriate international consultations" before conducting an activity that has the potential for harmful interference with space activities of other States Parties. This compilation is offered to advance the understanding of these, and other important issues.

The reader can find updated materials on an on-going basis at the Center's blog, *Res Communis*, at http://rescommunis.wordpress.com/.

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USA-193 Timeline

12/14/2006 – *USA-193* launched at 21:00 UTC from Vandenburg Air Force Base.[1] Shortly thereafter *USA-193* fails to function properly.

December 2007 – Rear Admiral Brad Hicks is contacted by Pentagon to gauge feasibility of satellite shoot down.[2]

1/3/2008 – Rear Admiral Brad Hicks contacted by Pentagon for "more detailed assessment" of feasibility of satellite shoot down.[3]

1/4/2008 – After a go ahead from the Bush administration, Raytheon Missile Systems and Lockheed Martin Corp. are contacted by U.S. Navy to assess the feasibility of intercepting *USA-193*.[4]

January 2008 – *USS Erie* crew begins practice drills for the intercept of *USA-193*.[5]

1/27/2008 – News of the orbital decay of *USA-193* in media outlets.[6]

2/14/2008 – The public announcement is made that the U.S. intends to shoot down *USA-193*.[7]

2/20/2008 – The military announced that the Navy successfully intercepted *USA-193* at 10:26 p.m. EST. The intercept was made with a modified Standard Missile-3 launched from the *USS Lake Erie*, an AEGIS warship. [8]

2/25/2008 – After debris analysis, the U.S. Military officials declares the *USA-193* mission a success.[9]

10/9/2008 – The final piece of debris from *USA-193* reenters the Earth's atmosphere.[10]

[1] NASA Space Science Data Center, *USA-193*, http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=2006-057A (last visited Jan. 14, 2008).
[2] Jack Gillum and David Wichner, *How the Satellite Shot went down*, ARIZONA DAILY STAR, Apr. 13, 2008, http://www.azstarnet.com/business/234028.
[3] *Id.*
[4] *Id.*
[5] Anna Mulrine, *The Satellite Shootdown: Behind the Scenes*, U.S. NEWS & WORLD REPORT, Feb. 25, 2008, http://www.usnews.com/articles/news/world/2008/02/25/the-satellite-shootdown-behind-the-scenes.html.
[6] *U.S. Spy Satellite, Power Gone, May Hit Earth*, NEW YORK TIMES, Jan. 27, 2008, http://www.nytimes.com/2008/01/27/us/27spy.html?em.
[7] *DoD News Briefing with Deputy National Security Advisor Jeffrey, Gen. Cartwright and NASA Administrator Griffin,* U.S. Department of Defense, Feb. 14, 2008, http://www.defenselink.mil/transcripts/transcript.aspx?transcriptid=4145.
[8] *Navy Missile Hits Decaying Satellite Over Pacific Ocean*, American Forces Press Service, Feb. 20, 2008, http://www.defenselink.mil/news/newsarticle.aspx?id=49024.
[9] *Satellite Debris Analysis Indicates Hydrazine Tank Hit,* U.S. Department of Defense News Release No. 0146-08, Feb, 25, 2008, http://www.defenselink.mil/releases/release.aspx?releaseid=11709.
[10] JONATHAN MCDOWELL, JONATHAN'S SPACE REPORT, no. 602, Oct. 26, 2008, http://host.planet4589.org/space/jsr/back/news.602.

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NROL-21

The United Launch Alliance launched a Boeing Delta 7920 on Dec 14 carrying a secret National Reconnaissance Office payload. The payload was to be deployed into an initial 354 x 376 km x 58.5 deg orbit. In contrast to most secret launches, analysts appear to have little clue as to what this payload may be. It has been given the cover name USA 193; it was on launch manifests as NRO launch 21 (NROL-21).

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SPACEWARN Bulletin
A monthly publication of the National Space Science Data Center/World Data Center for Satellite Information
No. 638
01 January 2007

SPACEWARN Activities

All information in this publication was received between 01 December 2006 and 31 December 2006.

A. List of New International Designations and Launch Dates (UTC).

COSPAR/WWAS INT.ID	USSTRATCOM CAT. #	SPACECRAFT NAME	LAUNCH DATE (UT)
2006-063A	29678	COROT	27 December 2006
2006-062C	29672	Cosmos NNNC	25 December 2006
2006-062B	29671	Cosmos NNNB	25 December 2006
2006-062A	29670	Cosmos NNNA	25 December 2006
2006-061A	29668	Meridian	24 December 2006
2006-060A	29658	Sar Lupe 1	19 December 2006
2006-059A	29656	Kiku 8	18 December 2006
2006-058B	29654	GeneSat 1	16 December 2006
2006-058A	29653	TacSat 2	16 December 2006
2006-057A	29651	USA 193	14 December 2006
2006-056A	29648	MEASat 3	11 December 2006
2006-055A	29647	STS 116	11 December 2006
2006-054B	29644	AMC 18	08 December 2006
2006-054A	29643	WildBlue 1	08 December 2006
2006-053A	29640	Fengyun 2D	08 December 2006

B. Text of Launch Announcements.

2006-063A

COROT is a French astronomical satellite, with major participation by ESA and other European astronomers, that was launched by a Soyuz 2 rocket from Baikonur at 14:23 UT on 27 December 2006. The 650 kg craft carries a 27 cm aperture telescope to scan the optical brightness of about 100,000 stars in the Galaxy. Every 512 seconds it will monitor about 10,000 stars through a set of four CCD arrays in the focal plane. Every 150 days, it will aim at a different field of view, to complete the mission in 2.5 years. The brightness of a star will drop by one percent or less when a planet transits in front of it. Another cause of brightness variation is stellar, acoustic seismic waves that culminate in patches of dimness/brightness on the photosphere due to standing waves. The COROT mission is believed to provide enough information so that a future such mission can distinguish the rocky (and potentially life-sustaining) planets among them. COROT is reported to be an acronym for COnvection ROtation and planetary Transit. The Project Scientist is Malcolm Fridlund of ESA. The initial orbital parameters were period 103 min, apogee 884 km, perigee 872 km, and inclination 90°.

2006-062A, 2006-062B, 2006-062C

Cosmos NNNA, **Cosmos NNNB**, and **Cosmos NNNC** are three navigational satellites in the Russian Glonass fleet that were launched by a Proton-K rocket from Baikonur at 20:18 UT on 25 December 2006. Until this launch the fleet consisted of 11 operational craft plus five that were often switched off. The full operational fleet of 24 craft is expected to be completed by 2009 with Cosmos-K models, developed with participation of the Indian Space Agency, ISRO. Though an 18-craft fleet is sufficient for operation in Russia, a fleet of 24 is needed for global coverage. The initial orbital parameters of the three were similar: period 674 min, apogee 19,037 km, perigee 19,020 km, and inclination 64.8°. (The usual Cosmos numbers and Glonass numbers remain unascertained.)

2006-061A

Meridian is a Russian communications satellite that was launched by a Soyuz-2 booster from Plesetsk at 08:34 UT on 24 December 2006. It will provide links between aircraft and ships in the North Sea area to coastal stations, as well as between locations in Siberia and the Russian Far East. The initial orbital parameters were period 727 min, apogee 39,670 km, perigee 979 km, and inclination 62.8°.

2006-060A

Sar Lupe 1 is a German military satellite that was launched by a Cosmos-3M rocket from Plesetsk at 14:00 UT on 19 December 2006. The 720 kg (dry mass) craft carries a Synthetic Aperture Radar (SAR) for providing all-weather, one-meter resolution images anywhere in the world. The mission is a German contribution to the joint Franco-German undertaking for mutual exchange of reconnaissance information. The initial orbital parameters were period 94 min, apogee 506 km, perigee 467 km, and inclination 98.2°.

2006-059A

Kiku 8, also known by its prelaunch name of ETS 8, is a Japanese geostationary, engineering test satellite that was launched by a H-2A rocket from Tanegashima Space Center at 06:32 UT on 18 December 2006. The 5.8 tonne (with fuel) craft carries solar panels and a pair of large wire-mesh antennas, one for transmitting and the other for receiving. The two 28 m x 25 m antennas will enable hand-held phones to communicate with another in S-band, after parking over 146° E longitude.

2006-058B

GeneSat 1 is an American (NASA-Ames) nanosatellite that was launched by a Minotaur rocket from Wallops Island in Virginia at 12:00 UT on 16 December 2006. The 10 kg craft carries *E. Coli* bacteria to monitor the effect of space radiation by protein-sensing optical instruments. After a few days of this "Astrobionics" experiment, the craft will be turned over to the students in California to track it. The initial orbital parameters were period 92.9 min, apogee 420 km, perigee 413 km, and inclination 40°.

2006-058A

TacSat 2 is an American military (AFRL) minisatellite that was launched by a Minotaur rocket from Wallops Island in Virginia at 12:00 UT on 16 December 2006. The 375 kg, 550 W satellite carries a 50 cm aperture telescope to provide images of any selected spot on Earth, as demanded by troop commanders in battle fields, in three visible wavelength bands. It is housed on a 3-axis stabilized platform with a pointing accuracy of 0.15°. The images will be down-loaded over the China Lake facility in California. The spacecraft

also carries several technology validation experiments. Initial orbital parameters were period 92.9 min, apogee 424 km, perigee 413 km, and inclination 40°.

2006-057A

USA 193 is an American military satellite that was launched from Vandenberg AFB at 21:00 UT on 14 December 2006. It is a highly classified spacecraft, owned and operated by the National Reconnaissance Office (NRO). No further details are available.

2006-056A

MEASat 3 is a Malaysian geostationary communications spacecraft that was launched by a Proton-M rocket from Baikonur at 11:30 UT on 11 December 2006. The 4.9 tonne (with fuel), 10.8 kW craft carries 24 C-band and 24 Ku-band transponders to provide direct-to-home reception of voice, video and internet services to about 100 countries between 50° E and 150° E, on either side of the equator after parking over 91.5° E longitude.

2006-055A

STS 116 is an American (NASA) shuttle spacecraft that was launched from Cape Canaveral at 01:47 UT on 10 December 2006. It carried a crew of seven (five Americans and two Europeans) to the International Space Station (ISS) to do some major repairs and installations. It docked with the ISS on 11 December. The crew disconnected the power lines leading to what has been a temporary source (since 1998) and connected them to the recently installed solar panels. The crew overcame problems in rolling back the older panels after three spacewalks, totaling several hours. They also made a spacewalk to install a two-tonne truss (P5) to enable additions to the station. The 13-day mission ended when the shuttle landed back in Cape Canaveral at 22:32 UT on 22 December. One of the seven members of the crew stayed on the ISS, replacing another astronaut who had stayed there for six months. The initial orbital parameters were period 91 min, apogee 338 km, perigee 315 km, and inclination 51.7°.

2006-054B

AMC 18 is an American geostationary communications spacecraft that was launched by an Ariane 5 ECA rocket from Kourou at 22:08 UT on 08 December 2006. The 2.1 kg craft carries 24 C-band transponders to provide voice, video and internet services to Canada, America, Mexico and Caribbean countries after parking over 105° W longitude.

2006-054A

WildBlue 1 is an American geostationary communications spacecraft that was launched by an Ariane 5 ECA rocket from Kourou at 22:08 UT on 08 December 2006. The 4.7 tonne (with fuel) craft carries several Ka-band transponders and spot-beams to provide high-speed internet connectivity in all states of America after parking over 111° W longitude.

2006-053A

Fengyun 2D is Chinese (PRC) geostationary weather satellite that was launched by a Long March 3A rocket at 16:53 UT on 08 December 2006. The 1.4 tonne craft will provide images of cloud conditions, typhoons and storms every half an hour, and data to infer sea temperatures and winds after parking over 86.5° E longitude.

C. Spacecraft Particularly Suited for International Participation

Spacecraft with essentially continuous radio beacons on frequencies less than 150 MHz, or higher frequencies if especially suited for ionospheric or geodetic studies.

NNSS denotes U.S. Navy Navigational Satellite System. Updates or corrections to the list are possible only with information from the user community.

Note: The full list appeared in SPX 545. The list will not be repeated in future issues until significantly revised again.

Global Positioning System satellites useful for navigational purposes and geodetic studies.

High precision (<20 cm) GPS constellation tracking data obtained from the network of about 80 dedicated global stations that are of interest to geodetic study may be obtained through the following services provided by the International Association of Geodesy (IGS)

```
FTP:    igscb.jpl.nasa.gov  [directory /igscb]
WWW:    http://igscb.jpl.nasa.gov/
E-mail: igscb@cobra.jpl.nasa.gov
```

The standard format of the GPS situation appeared in SPACEWARN Bulletin No. 518. It will not be repeated since an excellent source of trajectory- and science-related GPS information is at:

http://www.colorado.edu/geography/gcraft/notes/gps/gps_f.html

It provides many links to GPS related databases.

The latest addition to the fleet is Navstar 59, 2006-052A.

Russian Global Navigational (Positioning) Spacecraft, GLONASS constellation.

SPACEWARN requests updates/additions from readers to this list.

All GLONASS spacecraft are in the general Cosmos series. The Cosmos numbers invoked by USSPACECOM have often differed from the numbers (NNNN) associated in Russia; when different, the USSPACECOM Cosmos numbers are shown in parentheses. The corresponding GLONASS numbers are Russian numbers, followed by the numbers in parentheses that are sometimes attributed to them outside Russia.

The operating frequencies in MHz are computed from the channel number K. Frequencies (MHz) = 1602.0 + 0.5625K and L2 = 1246.0 + 0.4375K.

The standard format of the GLONASS situation last appeared in SPACEWARN Bulletin No. 545. It will not be repeated in view of the excellent updated source at: http://www.glonass-ianc.rsa.ru/ maintained by the Information-Analytical Center (IAC), Russian Space Agency.

Visually bright objects.

See http://www.space-track.org/perl/bulk_files.pl. Users must register. Conditions apply.

Actual decays/landings of payload spacecraft and rocket bodies (R/B) only. No further information is available.

Designations	Common Name	Decay Date (2006)
1992-003D (21850)	R/B Molniya	13 December

60-day Decay Predictions.

See http://www.space-track.org/perl/60day_decay_predict.pl. Users must register for access. Conditions apply

Miscellaneous Items.

This section contains information or data that are entered on occasion and may not be repeated in each issue of the SPACEWARN Bulletin.

Related NSSDC resources.

NSSDC/WDC for Satellite Information is an archival center for science data from many spacecraft. Many space physics datasets are on-line for electronic access through: http://nssdc.gsfc.nasa.gov/space/

For off-line data, please contact the Request Office, NSSDC, Code 633, NASA GSFC, Greenbelt, Maryland 20771, U.S.A., for specific information (request@nssdca.gsfc.nasa.gov). Information on the current status of the instruments on board from the investigators will be most welcomed. Precomputed trajectory files and orbital parameters of many magnetospheric and heliospheric science-payload spacecraft may be obtained from: ftp://nssdcftp.gsfc.nasa.gov/miscellaneous/orbits/

Other files of interest for Earth-centered spacecraft can be generated via the URL, http://sscweb.gsfc.nasa.gov/

Programs related to the heliospheric spacecraft trajectories can be executed through the URL, http://nssdc.gsfc.nasa.gov/space/helios/heli.html

Magnetospheric, Planetary, and Astronomical science data from many spacecraft may be accessed through links from the URL: http://nssdc.gsfc.nasa.gov/sc-query.html

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United Nations ST/SG/SER.E/514

Secretariat

Distr.: General
17 September 2007

Original: English

Committee on the Peaceful Uses of Outer Space

Information furnished in conformity with the Convention on Registration of Objects Launched into Outer Space

Note verbale dated 6 September 2007 from the Permanent Mission of the United States of America to the United Nations (Vienna) addressed to the Secretary-General

The Permanent Mission of the United States of America to the United Nations (Vienna) presents its compliments to the Secretary-General of the United Nations and, in accordance with article IV of the Convention on Registration of Objects Launched into Outer Space (General Assembly resolution 3235 (XXIX), annex), has the honour to transmit registration data on space launches by the United States for December 2006 (see annex).

V.07-86848 (E) 210907 240907

Annex

Registration data on space launches by the United States of America for December 2006*

The following report supplements the registration data on United States launches as at 31 December 2006. All launches were made from the territory of the United States unless otherwise specified.

International designation	*Name of space object*	*Date of launch*	*Location of launch*	*Basic orbital characteristics*				*General function of space object*
				Nodal period (min)	*Inclination (degrees)*	*Apogee (km)*	*Perigee (km)*	
The following objects were launched since the last report and remain in orbit:								
2006-054A	WildBlue 1	8 December 2006	Kourou, French Guiana	636.8	2.3	35 978	307	Spacecraft engaged in practical applications and uses of space technology such as weather or communications
2006-054B	AMC 18	8 December 2006	Kourou, French Guiana	644.1	1.8	35 909	294	Spacecraft engaged in practical applications and uses of space technology such as weather or communications
2006-055B	MEPSI	10 December 2006	-	89.3	51.6	254	228	Spacecraft engaged in practical applications and uses of space technology such as weather or communications
2006-055C	RAFT	10 December 2006	-	89.3	51.6	254	228	Spacecraft engaged in practical applications and uses of space technology such as weather or communications
2006-055D	MARScom	10 December 2006	-	89.3	51.6	254	228	Spacecraft engaged in practical applications and uses of space technology such as weather or communications
2006-055E	ANDE Cylinder 1	10 December 2006	-	89.3	51.6	254	228	Spacecraft engaged in practical applications and uses of space technology such as weather or communications
2006-055F	ANDE MAA Sphere 1	10 December 2006	-	89.3	51.6	254	228	Spacecraft engaged in practical applications and uses of space technology such as weather or communications

* The registration data are reproduced in the form in which they were received.

International designation	*Name of space object*	*Date of launch*	*Location of launch*	*Basic orbital characteristics*				*General function of space object*
				Nodal period (min)	*Inclination (degrees)*	*Apogee (km)*	*Perigee (km)*	
2006-055G	ANDE Cylinder 2	10 December 2006	-	89.3	51.6	254	228	Spacecraft engaged in practical applications and uses of space technology such as weather or communications
2006-055H	ANDE Avionics Deck	10 December 2006	-	89.3	51.6	254	228	Spacecraft engaged in practical applications and uses of space technology such as weather or communications
2006-055J	ANDE FCAL Sphere 2	10 December 2006	-	89.3	51.6	254	228	Spacecraft engaged in practical applications and uses of space technology such as weather or communications
2006-057A	USA 193	14 December 2006	-	91.76	58.53	355	367	Spacecraft engaged in practical applications and uses of space technology such as weather or communications
2006-057B	Delta 2 R/B	14 December 2006	-	89.8	51.98	268	170	Spent boosters, spent manoeuvring stages, shrouds and other non-functional objects
2006-058A	TacSat 2	16 December 2006	-	93.0	40.0	426	418	Spacecraft engaged in practical applications and uses of space technology such as weather or communications
2006-058B	Minotaur R/B	16 December 2006	-	93.0	40.0	424	418	Spent boosters, spent manoeuvring stages, shrouds and other non-functional objects
2006-058C	GeneSat	16 December 2006	-	92.9	40.0	424	418	Spacecraft engaged in practical applications and uses of space technology such as weather or communications

The following objects not previously reported have been identified since the last report:

None.

The following objects not previously reported have been identified since the last report but were no longer in orbit as at 2400Z 31 December 2006:

None.

The following objects achieved orbit since the last report but were no longer in orbit as at 2400Z 31 December 2006:

2006-055A	STS-116	10 December 2006	-	89.3	51.6	254	228	Reusable space transportation systems

The following objects identified in a previous report were no longer in orbit as at 2400Z 31 December 2006:

1961-015LV, 1993-042D, 2006-042C, 2006-050AF

International designation	*Name of space object*	*Date of launch*	*Location of launch*	*Basic orbital characteristics*				*General function of space object*
				Nodal period (min)	*Inclination (degrees)*	*Apogee (km)*	*Perigee (km)*	

The following objects were launched since the last report but did not achieve orbit:

None.

Revisions that should be made to previously reported data:

None.

Search Results

Important Note: Information in square brackets ([and]) and highlighted in green has been obtained from other sources and has not been communicated officially to the United Nations.
Reference to external websites does not imply endorsement by the United Nations Office for Outer Space Affairs (UNOOSA) of their contents. The views expressed are those of the authors and do not necessarily reflect the policies or views of UNOOSA. The hyperlinks are provided solely for informational purposes.

Criterias:

Result:

1 Objects found. Displaying **20** per page.

Name of Spaceobject:'USA 193'

0-1 of 1

International Designator	Name of Space Object	State/ Organization	Date of Launch	GSO Location	Nuclear Power Source	UN Registered	Document of Registration	Status	Date of Decay or Change	Document of Decay or Change	Function of Space Object	Remarks	Externa Web Sit
2006-057A	USA 193	USA	14/12/2006			Yes	ST/SG/SER.E/514	in orbit			Spacecraft engaged in practical applications and uses of space technology such as weather or communications	------	

Please send comments and recommendations to: oosa@unvienna.org

back to original

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Atmospheric Reentry of a Hydrazine Tank

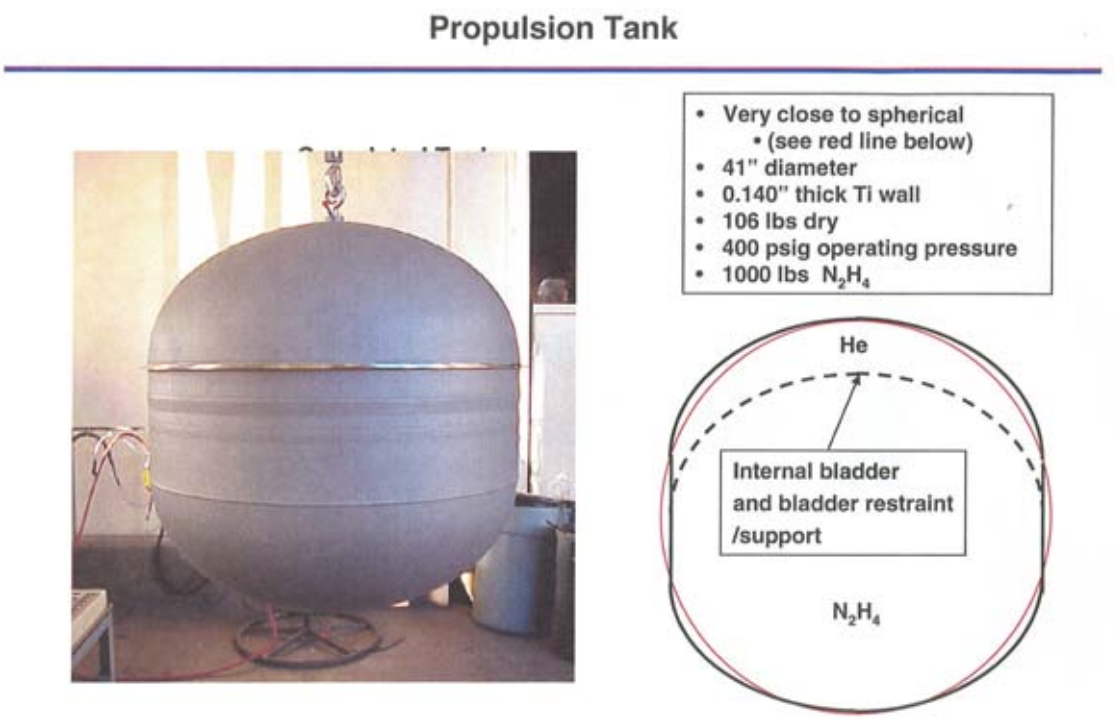
Robert L. Kelley, William C. Rochelle,
ESCG
Houston, TX

Introduction

The purpose of this white paper is to describe the methods used to predict the survivability of a titanium tank loaded with frozen hydrazine reentering the Earth's atmosphere. The paper begins by describing the details of the problem, followed by the methods used to gather required data for a reentry simulation. This paper also presents results created during the analysis. The focus of the paper is a discussion of the heat transfer methods used; therefore, only a brief discussion regarding calculations of net heat rates to the body, trajectory calculations, and aerodynamic calculations are presented.

Problem

The initial presentation of the problem was that of a tank containing frozen hydrazine (N2H4) contained within a vehicle reentering the atmosphere due to natural decay from a nearly circular orbit. The tank is essentially spherical with a diameter of 1.0414 meters (41 inches) and a wall thickness of 0.00356 meters (0.14 inches). In addition, the tank contained 453.59 kg (1000 lbs) of frozen N2H4.



Gathering Required Data for Modeling

The properties of N2H4 required for the analysis were the specific heat capacity (Cp), thermal conductivity, density, emissivity, heat of fusion, oxide heat of formation, and melting temperature. These values are summarized in Table 1 below. The specific heat capacity for liquid was found to be 3084.1 J/kg-K (Ref. 1). Using a relationship between the specific heat capacity of ice to that of water (approximately 0.506), Cp for liquid N2H4 was multiplied by that value to get a value of 1559.45 J/kg-K. The thermal conductivity was found to be 1.57 W/m-K. The density of N2H4 was found to be 1025.3 kg/m^3 at 0° C which is below the freezing point of 2° C (Ref. 1). An emissivity value of 0.5 was arbitrarily assigned. The heat of fusion for N2H4 was found to be 395024.9 J/kg (Ref 1.). The oxide heat of formation was set to 0, as this value only applies to metals. Finally, the melting temperature was found to be 275 K.

Property	Value
specific heat capacity, Cp (J/kgK)	1559.45
thermal conductivity, k (W/mK)	2.4
density, rho (kg/m^3)	1025.3
emissivity,	0.5
heat of fusion (J/kg)	395024.97
oxide heat of formation (J/kg-O2)	0
melting temperature, Tm (K)	275

Table 1 - Summary of N2H4 Properties

In addition to the properties of the N2H4, the same properties were required for Ti, which in this case was assumed to be Titanium (6 Al-4 V). For this material Cp, thermal conductivity, and emissivity are all temperature dependant, and plots of these values can be seen below in Figures 1-3, respectively. The remaining values are summarized in Table 2 below (Ref. 2).

Property	Value
specific heat capacity, Cp (J/kgK)	Figure 1
thermal conductivity, k (W/mK)	Figure 2
density, rho (kg/m3)	4437
emissivity,	Figure 3
heat of fusion (J/kg)	393559
oxide heat of formation (J/kg-O2)	32481250
melting temperature, Tm (K)	1943

Table 2 - Summary of Ti (6 Al-4 V) Properties

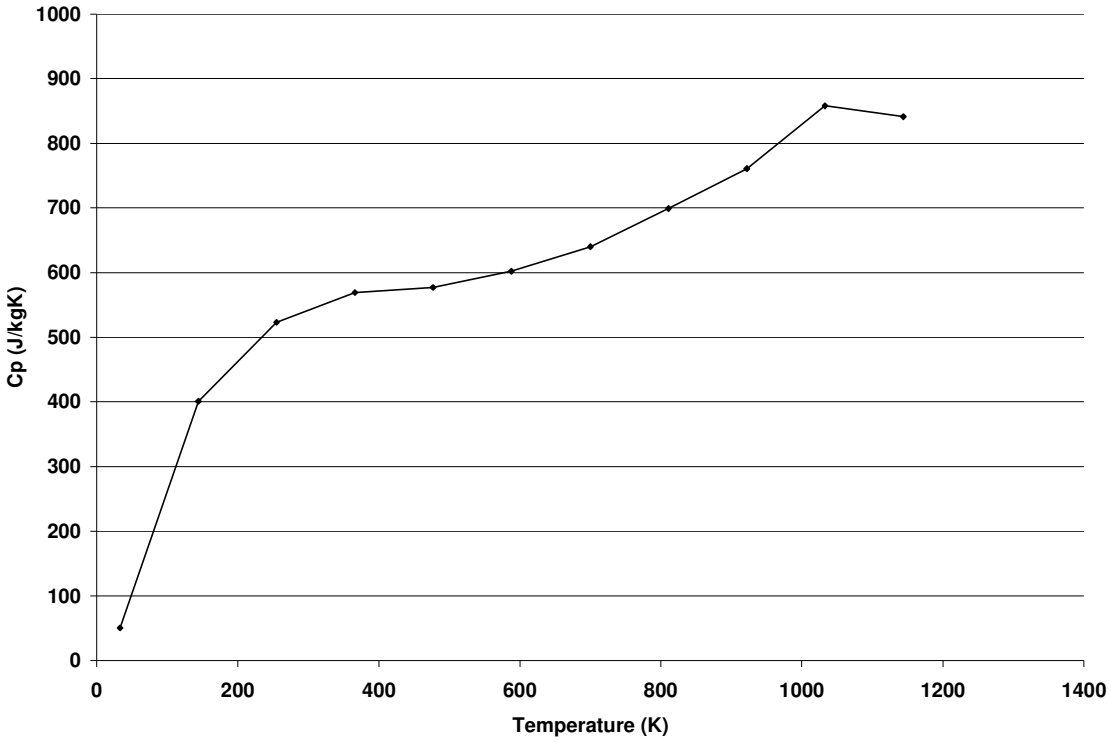


Figure 1 – Specific Heat Capacity (J/kgK) of Ti (6 Al-4 V) vs. Temperature (K)

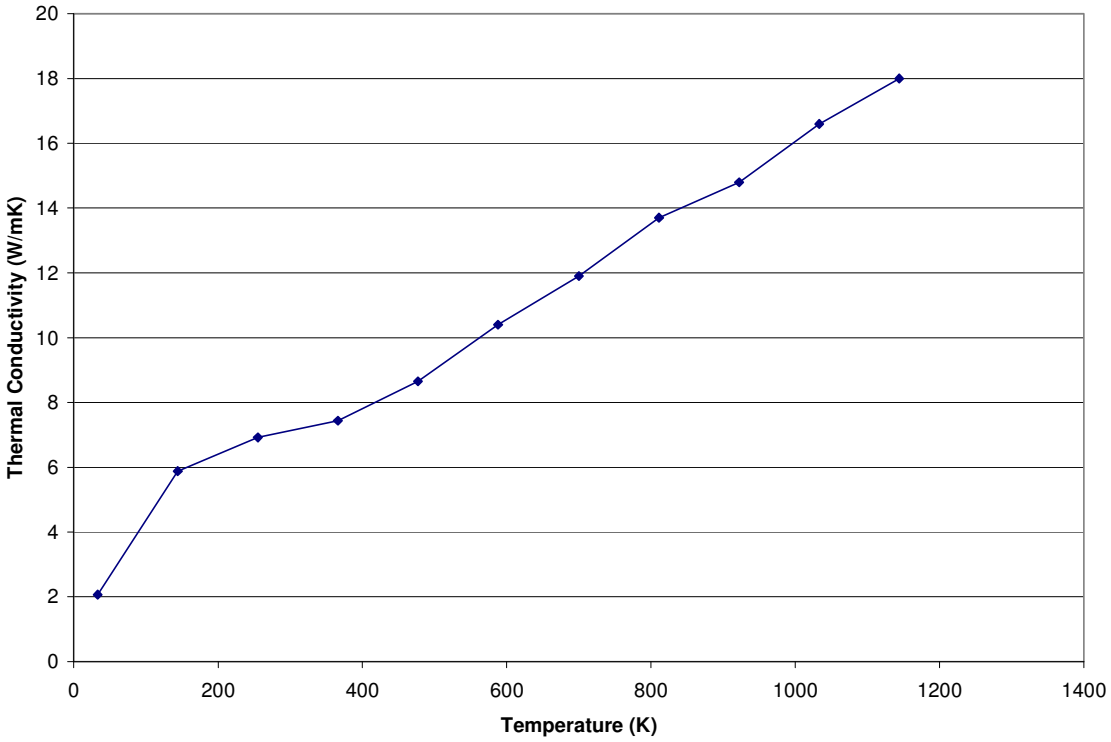


Figure 2 – Thermal Conductivity (W/mK) of Ti (6 Al-4 V) vs. Temperature (K)

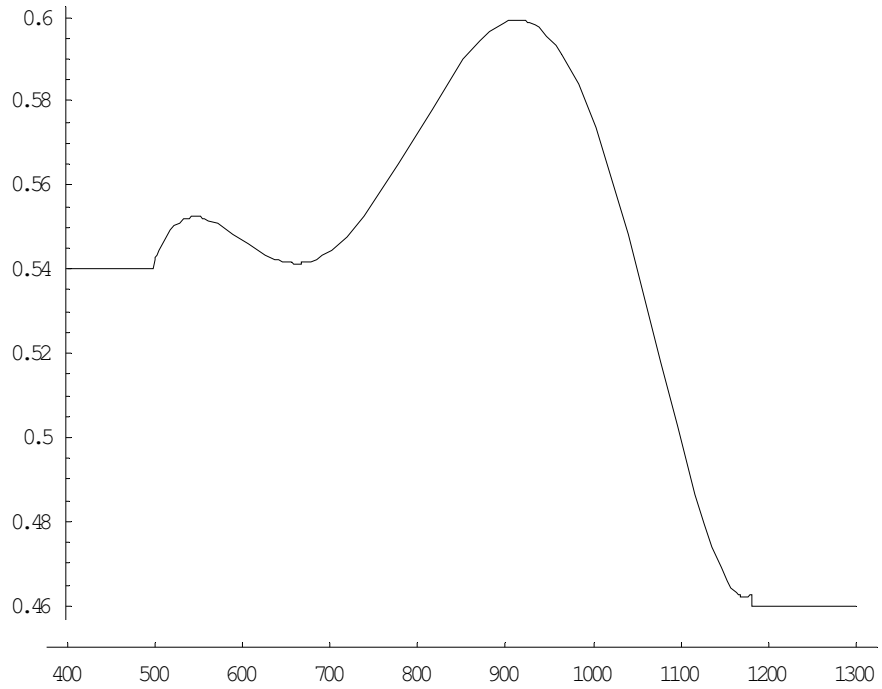


Figure 3 – Emissivity of Ti (6 Al-4 V) vs. Temperature (K)
(Note: For temperatures below 400 K emissivity is constant 0.54 and for temperatures above 1300 K emissivity is a constant 0.46)

Modeling the heat transfer through and into a partially filled tank undergoing reentry into the atmosphere presents several challenges. The volume of the tank is approximately 0.579 m^3 of which the N2H4 occupies 0.442 m^3, assuming a density of N2H4 at 0° C of 1025.3 kg/m^3 and the mass of 453.6 kg. The remaining volume contains a pressurant and an internal bladder and bladder restraint/support. The N2H4, therefore, is in contact with only a portion of the interior wall of the tank. Initially, the principal heat transfer modes would be via conduction where the N2H4 is in contact with the tank wall and via radiation elsewhere.

Based upon experience, the vehicle containing the tank will probably break-up due to aerodynamic forces at an altitude of approximately 78 km. At this time the tank should separate from the vehicle intact under spin, and the pressure inlet and the N2H4 outlet lines should be severed. These lines normally are made of lower melting temperature materials and, again from experience, are assumed to burn off completely during reentry, resulting in the release of the pressurant and the exposure of the frozen N2H4 to a small outlet opening. The effect of the openings on the heat transfer process are assumed to be negligible.

If the heat transfer process is sufficient to permit initially melting of the N2H4 in immediate contact with the inner wall of the tank, this liquid N2H4 will be susceptible to expulsion from the tank, hindering potential convection processes. If sufficient N2H4 is melted, the remaining frozen N2H4 would no longer be firmly in contact with the inner wall of the tank and would be susceptible to internal movement and fracture from forces associated with the spinning, decelerating tank.

Two bounding heat transfer modeling techniques were considered. The first envisioned a solid ball of frozen N2H4 in the center of the tank with a vacuum (following depressurization of the tank at the time of vehicle break-up) between it and the tank inner wall. In such a case, the principal subsequent heat transfer mode into the N2H4 would be via radiation. Alternatively, the N2H4 could be envisioned as a uniform shell, i.e., material layer, affixed to the complete inner wall of the tank with a dead space in the center. This internal layer of N2H4 would have a thickness of 0.197 m. Both cases were analyzed. The second case (material layer), relying on more efficient conduction heat transfer processes, would represent a better opportunity for melting of the N2H4 and is described below.

The initial temperature of the tank and the N2H4 was dictated to be 214 K for this study, although the actual temperature would very likely be higher. The initial relative velocity at an altitude of 78 km was set to 7.58 km/sec, and the initial flight path angle was chosen as -0.2°, a standard value for a spacecraft reentering from a nearly circular orbit.

Trajectory

This analysis utilized a 3-Degree-of-Freedom (3-DOF) trajectory propagated by integrating relative equations of motion for the time rate of change of altitude, relative velocity, relative flight path angle, and longitude. To solve these trajectory equations a 4^{th} order Runge-Kutta numerical scheme is used. For orbital decay the relative velocity and flight path angle are input, which for this case were 7.58 km/sec and -0.2°, respectively. Since this is an uncontrolled reentry an initial longitude of 0° is assigned.

Atmosphere

The atmosphere model used for this analysis was the U. S. Standard Atmosphere 1976 model (Ref. 3). This is a steady-state (year-round) model of the Earth's atmosphere at latitude 45°N during moderate solar activity.

Aerodynamics

The drag coefficient is used to compute the ballistic coefficient contained in the trajectory equations for time rate of change velocity. The present analysis was for that of a sphere, which was considered to be spinning. For a spinning sphere there are two constant values of the drag coefficient; one for the free-molecular regime, and one for the continuum regime, which are 2.00 and 0.92, respectively. For the transitional regime a modified Lockheed bridging function based on reference 4 is used as:

$$C_{D_{tran}} = C_{D_{cont}} + \left(C_{D_{fm}} - C_{D_{cont}}\right)\left\{\sin\left[\pi\left(0.5 + 0.25\log_{10} Kn\right)\right]\right\}^3 \qquad (1)$$

where the continuum and free molecular values are as above, and Kn is the Knudson number.

Aerothermodynamics

The methods used to calculate convective heating rates in this analysis are based on the object geometry (in this case a sphere), Stanton No., and Knudson No. within free-molecular flow, continuum flow, or transitional flow in which a bridging function is used.

For a sphere the stagnation point cold wall heating rate in continuum flow is obtained from the Detra, Kemp and Riddell method of reference 5. For free molecular flow the following equation is used:

$$q_{st_{fm},cw} = \frac{\alpha_T \rho_\infty V_\infty^3}{2} \tag{2}$$

where α_T = thermal accommodation coefficient = 0.9 .

This equation applies for values of Knudsen numbers greater than 10.0. If the thermal accommodation coefficient of equation 2 were set equal to 1, the stagnation heating rate would give the maximum heat rate due to kinetic energy in the flow. For transitional flow (0.01 < Kn < 10), the variation of Stanton No. versus Knudson number based on Cropp (Ref. 6) is obtained from a table look up and the stagnation point heat rate is defined by:

$$\dot{q}_{st_{trans}} = St\left(0.5\rho_\infty V_\infty^3\right) \tag{3}$$

where St is the Stanton number, ρ_∞ is the free stream density, and $V\infty$ is the free stream velocity.

The cold wall heating rate is multiplied by a factor that accounts for the average heating over the surface due to spinning of the sphere (0.275 for continuum, and 0.25 for free molecular). This cold wall heating rate is then converted to a hot wall value based on the following enthalpy ratio:

$$q_{hw} = q_{cw}\left(\frac{h_{st} - Cp_{air}T_w}{h_{st} - Cp_{air}T_{cw}}\right) \tag{4}$$

where stagnation enthalpy, h_{st}, is computed as

$$h_{st} = \frac{V_\infty^2}{2} + Cp_{air}T_\infty \tag{5}$$

where V_∞ is the free-stream velocity and the temperature of the cold wall, T_{cw}, is set to 214 K in this analysis. The specific heat of air, Cp_{air}, is taken as a function of wall temperature, T_w

$$\begin{aligned} Cp_{air} &= 1373 \quad \frac{\text{J}}{\text{kg}-\text{K}}, && T_w \geq 2000\text{K} \\ Cp_{air} &= 959.9 + 0.15377T_W + 2.636\times10^{-5}T_W^2, && 300\text{ K} \leq T_w \leq 2000\text{K} \\ Cp_{air} &= 1004.7 \quad \frac{\text{J}}{\text{kg}-\text{K}}, && T_w \leq 300\text{ K} \end{aligned} \tag{6}$$

The net heating rate to a reentering object is computed as the sum of the hot wall heating rate, the oxidation heating rate, and the gas cap radiative heating rate (negligible for orbital or suborbital entry), minus the reradiative heating rate. The oxidation heating rate is based on the heat of oxidation of the material and an oxidation efficiency (usually assumed to be the mean value of 0.5). The reradiation heat rate is based on the time-varying wall temperature raised to the fourth power and the surface emissivity.

Heat Transfer

For a spinning sphere this analysis assumed a 1D heat conduction model, meaning that heat was assumed to be conducted only in the radial direction. With the N2H4 being treated as a material layer of the sphere, a standard finite difference method was used. Utilizing a Forward Time Central Space finite difference solution for a hollow sphere, the temperature response can be determined. The differential equation for this 1D thermal math model (TMM) is written in spherical coordinates as:

$$\rho Cp \frac{\partial T}{\partial t} = \frac{1}{r^2} \frac{\partial}{\partial r} \left(kr^2 \frac{\partial T}{\partial r} \right) \tag{7}$$

At each interior node j in a 1D TMM, the temperature is computed using the following finite difference relationships for the absorbed heat Q:

$$Q_{in} = G\left(T_{j+1} - T_j\right)\Delta t \tag{8}$$

$$Q_{out} = G\left(T_j - T_{j-1}\right)\Delta t \tag{9}$$

$$T_i = T_{i-1} + \frac{Q_{in} - Q_{out}}{mCp} \tag{10}$$

where the subscripts i, j refer to the current value, and node (j=1 being the interior node), respectively, and G is the radial conductor defined as:

$$G = \frac{4\pi k}{\frac{1}{r_1} - \frac{1}{r_2}}; \tag{11}$$

where k is the thermal conductivity defined in the material properties and m is the mass of the node.

At the surface

$$T_{wall} = \frac{q_{net} A_s}{G} + T_{old} \tag{12}$$

$$Q_{in} = G\left(T_{wall} - T_{old}\right)\Delta\ t \tag{13}$$

$$q_{net} = q_{hw} + q_{ox} - q_{rr} \tag{14}$$

where q_{net} is the net heating rate to the outer wall, q_{hw} is the hot wall convective heating rate, q_{ox} is the oxidation (or chemical) heating rate, q_{rr} is reradiative heating rate, and A_s is the surface area. Since several parameters are dependant on the surface temperature, an iteration is performed to converge to the surface temperature at each time step (Ref. 2).

In order for the outer Ti skin to lose nodes or ablate, the absorbed heat must be greater than the heat of ablation, or

$$Q_{in} > H_{ablat} = m[h_f + Cp(T_{melt} - T_i)] \quad (15)$$

where h_f = the heat of fusion for the material, and m is the mass of the layer.

Results

Under the initial conditions and modeling techniques described above, it was found that the N2H4 located inside of the Ti tank does not reach its melting temperature, only reaching a maximum temperature of 255.6 K. During this time the Ti tank does reach 1943 K, its melting temperature, and four of its five nodes do ablate, but the heat absorbed into the Ti is insufficient for it to ablate the final node based on Eq. (15). Using the mass of 453.6 kg, and the assumed heat capacity of 1559.45 J/kg-K, the N2H4 would have needed to absorb 43.15 MJ of energy (heat of ablation) to reach 275 K from the start temperature of 214 K. It only absorbed 29.34 MJ, or about 68% of that.

Figure 4 below shows the net heating rate to the tank, as well as each of the heating rate components used to calculate q_{net} , all with respect to time. It can be seen from the plot that the maximum net heating rate occurs early in the trajectory (at about 10 seconds), reaching about 22 W/cm^2. Figure 5 shows the net heating again, as well as the total absorbed heat into the body and the total heat absorbed into the N2H4 layer, again with respect to time. As addressed above, the maximum heat absorbed into the N2H4 is about 29.34 MJ. Figures 6 and 7 both plot the temperature of the N2H4 as a function of time, with figure 6 including the tank surface temperature and figure 7 showing an expanded scale of the N2H4 temperature.

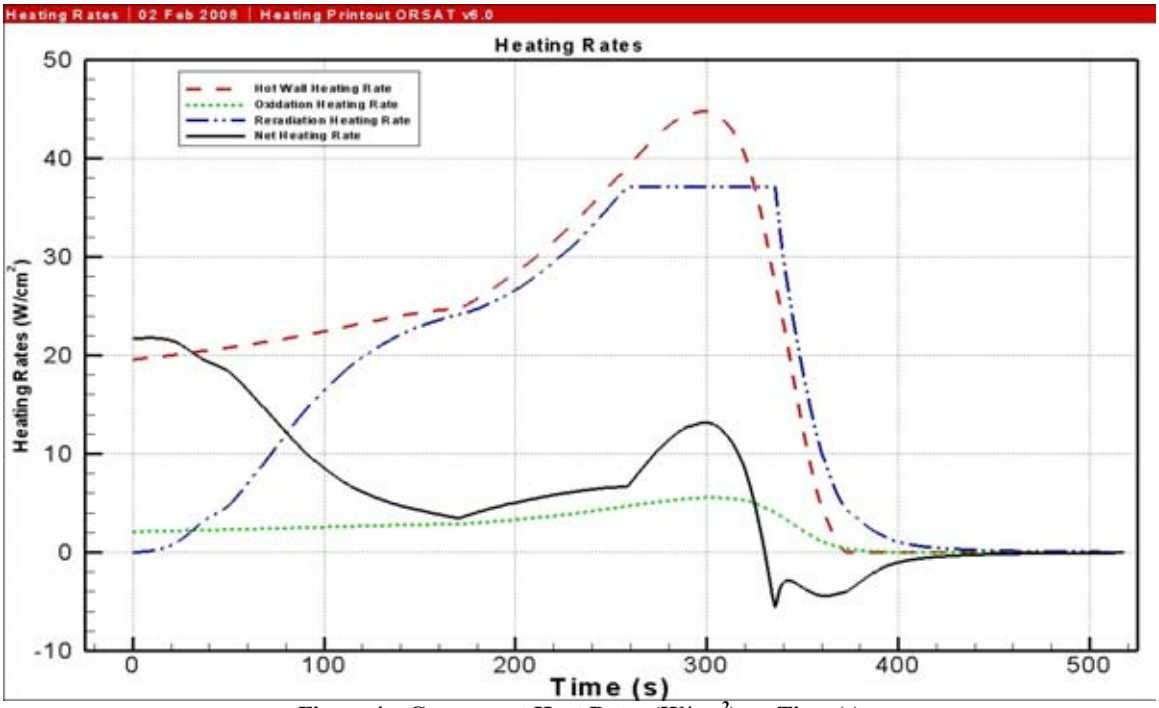


Figure 4 – Component Heat Rates (W/cm^2) vs. Time (s)

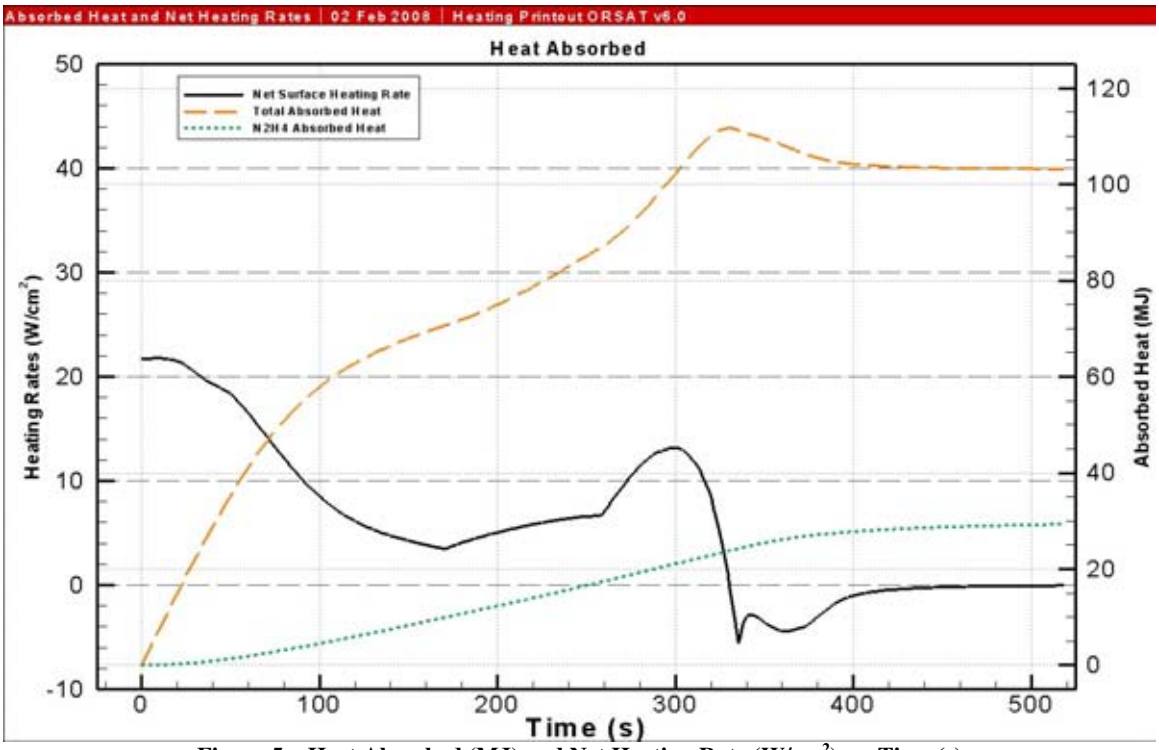


Figure 5 – Heat Absorbed (MJ) and Net Heating Rate (W/cm^2) vs. Time (s)

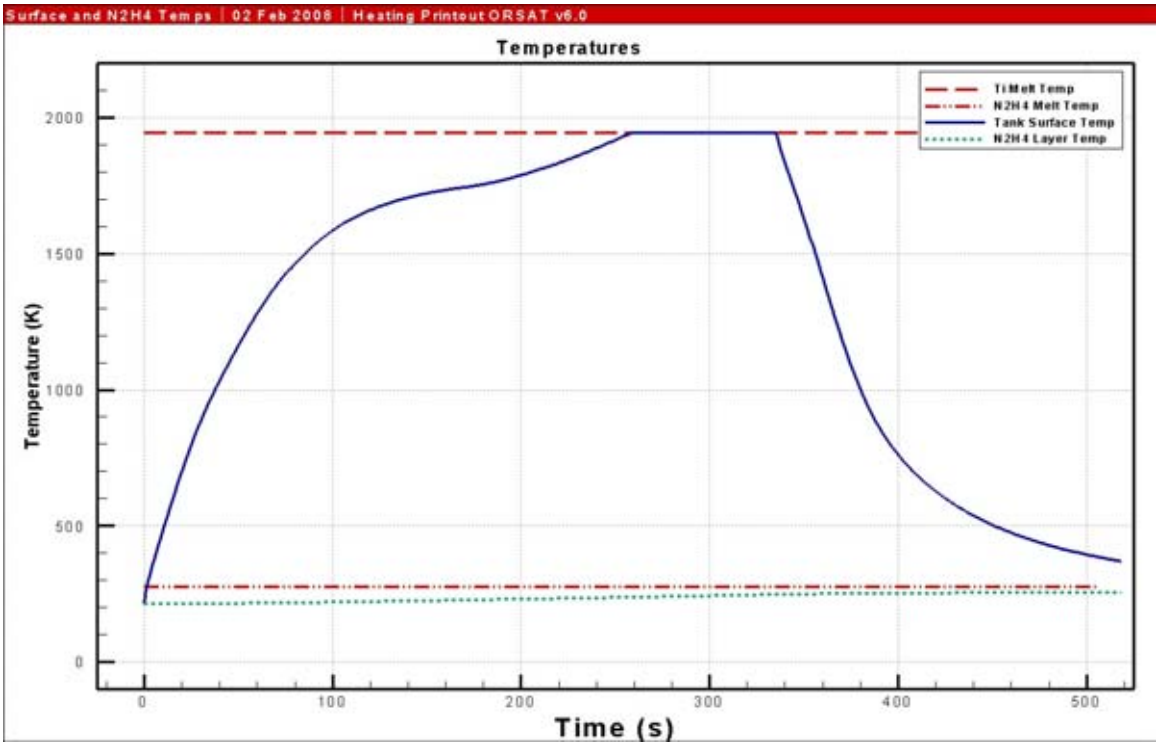


Figure 6 – Ti Surface and N2H4 Layer Temperatures (K) vs. Time (s)

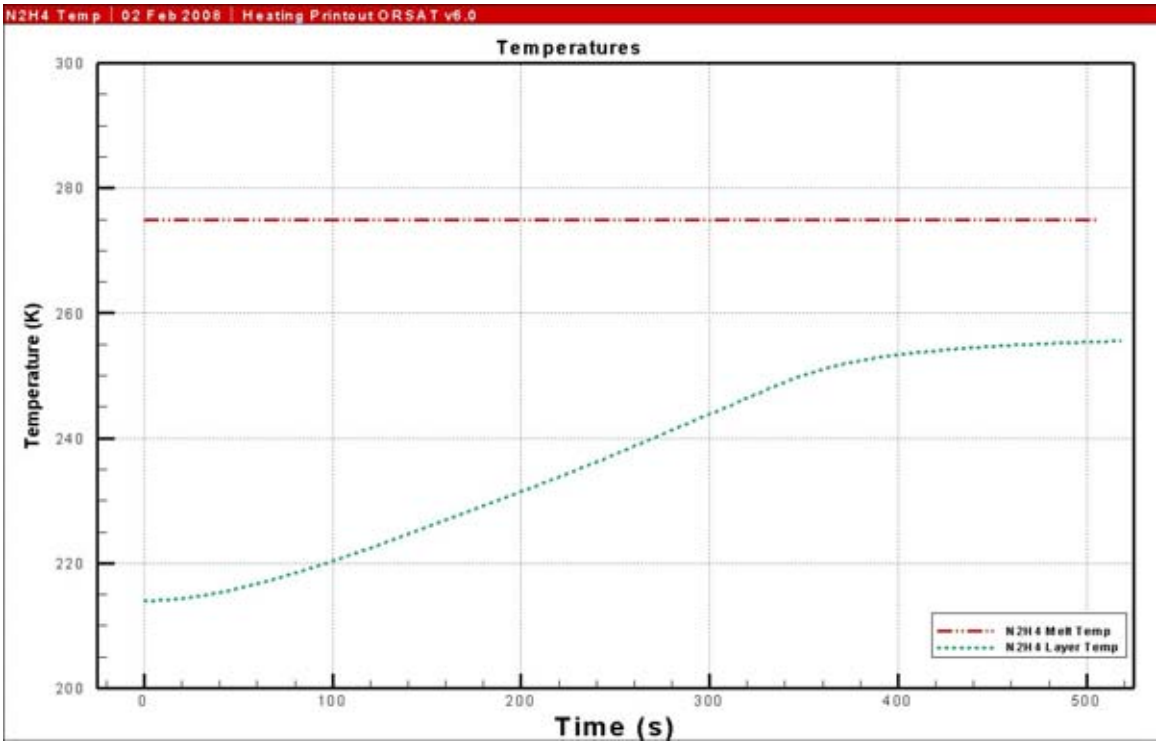


Figure 7 – N2H4 Layer Temperature (K) vs. Time (s)

Conclusions

As applied in this analysis, the assumptions for the materials and the heating rate methods do not predict that the N2H4 would melt during reentry due to orbital decay. In addition to these assumptions, there are also simplifications made for this analysis which may impact the results. The treatment of the frozen N2H4 has presented itself as a unique challenge.

Of the N2H4 material values used in the present analysis, the specific heat capacity remains to be the one value based on the properties of other materials. In addition, most of the material data used here is set to constant values, while typically material properties show some sort of temperature dependence. Any improvements to the material model of N2H4 will impact the results produced.

The simplification in this model which could have the largest impact is also difficult to address. It is extremely likely that the N2H4 in contact with the Ti wall will melt away in layers. As modeled in this analysis, the N2H4 is treated as a single layer, meaning that enough heat must be absorbed to raise the temperature of the entire mass of N2H4, and then enough heat must be absorbed to melt the entire mass. Current limitations in the process being used prevent the option of splitting the N2H4 into multiple layers, thereby impacting the fidelity of the model in this scenario. As noted previously, any melted N2H4 might be expect to be expelled from the tank through the open propellant outlet or even through the pressurants inlet, if the bladder is ruptured. In such a case, the principal heat transfer mode would reset to conduction.

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OASD SATELLITE ENGAGEMENT COMMUNICATIONS PLAN, 14 FEB 08

Background

An uncontrollable National Reconnaissance Organization (NRO) satellite will reenter Earth's atmosphere between the end of February and early March. Analysis indicates that approximately 2,500 pounds (1134 Kilograms) of satellite debris will survive reentry including 1,000 pounds (453 Kilograms) of propellant fuel (hydrazine), classified as a hazardous material. Congressional leadership was updated on the situation by the NRO on 25 Jan 08 and State Department instructed U.S. Embassies to notify key foreign governments on 26 Jan 08. The President of the United States has made a decision to use the best available means to mitigate the hazard in order to minimize the risk to human lives. Actions for mitigation may begin as early as 15 Feb 08.

Public Affairs Posture

Following the public announcement by DoD, OSD public affairs will encourage an active posture in discussing this specific engagement and the situation. Questions beyond the scope of this guidance will be referred to OASD/PA. DoD has the PA lead through engagement, reentry and tracking phases. The debris field from this reentry could extend over multiple areas, over multiple days. If debris from this satellite lands in the United States, lead for public affairs shifts to DHS. If debris from this satellite lands outside the United States, lead for public affairs remains with DoD, with DOS supporting through public diplomacy activities in any affected foreign countries.

Objectives

- Reinforce key message that the USG is committed to safe, responsible space operations, and is concerned about public safety.
- Maintain or improve the lines of communication with allies and other foreign governments to ensure timely and accurate information is conveyed.
- Build confidence that the USG elements are equipped, trained and ready to respond around the globe.
- As accurately, completely, and expediently as possible, answer queries from the media and the public regarding U.S. efforts to address reentry of the U.S. satellite.

Key Themes and Messages: ENGAGEMENT

- The President of the United States has decided to take action to reduce the small risk to people and property by engaging a non-functioning decaying U.S. satellite about to reenter Earth's atmosphere.

- Based on our modeling and analysis, we have high confidence that this engagement will be successful. The distinguishing facts with this satellite are 1) the amount of material expected to survive reentry, 2) the amount of hazardous material (1,000 pounds of hydrazine), and 3) the fact that this satellite is uncontrollable.

    - In a controlled reentry, we have the opportunity to manage risk by causing the reentry to occur over the ocean or sparsely populated areas.

    - In the past, no feasible options existed to mitigate the risks associated with a similar uncontrolled reentry of hazardous material.

- After long and thoughtful consideration, the decision to engage our satellite was selected as the best course of action to mitigate risks to human lives from an uncontrolled satellite carrying about 1000 pounds of hazardous fuel.

- This decision was not taken lightly. In order to engage this satellite, our existing defensive system required significant modification.

- This option lowers the risk to those on Earth.

- Timing of engagement is dependent on the location of the satellite. We will engage at a low altitude where we can expect the greatest probability of success while minimizing risk to other space objects and to people from falling debris.

- Our intent is to maximize probability of success and minimize the risk of falling debris and hazardous fuel from hitting the earth, and ensure negligible space debris.

- This capability was not previously part of the SM-3 designed capability; extensive modifications were required.

Reentry themes and messages

- The U.S. is committed to safe and responsible space operations. This includes taking responsibility for our falling debris and doing everything possible to mitigate its impact for this engagement.
- Experts are unable to determine when and where debris will reenter prior to engagement.
- This satellite reentry is solely a U.S. responsibility.
- In the event pieces from this reentry impact populated areas and causes damage, the United States will offer to respond promptly.
- Experts from across DoD and the U.S. government have been working diligently to assess the potential hazards associated with the debris. (This area of concern shifts to DHS/DOS as appropriate.)
- The Federal Emergency Management Agency (FEMA) and other federal agencies have been planning for and are ready to respond to this situation.

Space themes and messages

- The United States has developed, launched and is operating many incredibly complex systems. History has demonstrated clearly that not all efforts will be successful.
- For more than 50 years, it has been our longstanding policy and belief in the right of all nations to use space for peaceful purposes. This is reflected in the 1967 Outer Space Treaty, to which all major space-faring nations are party, including the United States. It is also reflected in the U.S. National Space Policy.
- Reentry of low-earth orbiting objects is a common occurrence. Hundreds of satellites have de-orbited over the past 50 years. Each year, space objects of varied size and shape reenter the Earth's atmosphere, some in a controlled manner and others uncontrolled. Since 2005, roughly 210 objects have reentered the Earth's atmosphere.

- The United States and other nations that are parties to the Outer Space Treaty are responsible for all aspects of their respective space activities.

Tactics:

AUDIENCE	PRINCIPAL	STAFF	TARGETS	TACTICS	STATUS
Interagency	NSC, DOS, DHS	OSD (Mr Henry), JCS (Gen Cartwright), DHS/FEMA	NSC, WHO-LA, DOS, Select Agencies	Complete interagency coordination of PA products	On-Going
Foreign Governments	DOS	DOS (Mr Buenneke, Mr Katsapis)	Burnt Frost partners, MD Cooperative Program partners, Allies approached for Chinese ASAT demarche, other major spacefaring nations notified on reentry	Conduct Diplomatic Notations, Briefings to Washington Diplomatic Corps	Estimated Start: 14 Feb 08, 1130 hrs
International Organizations	DOS	DOS (Mr Buenneke, Mr Katsapis)	NATO, UN Security Council, Conference on Disarmament, Committee on the Peaceful Use of Outer Space, European Space Agency	Conduct Diplomatic Notifications	Estimated Start: 14 Feb 08, 1130 hrs
Congress	OASD/LA	Amb Jeffrey (NSC), Mr Henry (OSD), Gen Cartwright (JCS), Mr Griffin (NASA), Gen Chilton (STRATCOM)	Senate, House	Conduct Congressional Briefings	Estimated Start: 14 Feb 08, 1230 hrs
Media & US/Intl Public	OASD/PA	NSC (Amb Jeffrey), JCS (Gen Cartwright), DHS (Mr Cannon), NASA (Mr Griffin)	National/International Press	Conduct DoD Press Briefing	Estimated Start: 14 Feb 08, 1430 hrs

AUDIENCE	PRINCIPAL	STAFF	TARGETS	TACTICS	STATUS
Echo Chamber	OASD/PA	OASD/PA (Ms Healy, Lt Col Finn, Maj Ryder)	Opinion Influencers	Conduct Conf Call for Military Analysts	Estimated Start: 14 Feb 08, Time TBD
Potential Country (Countries) of Impact	DOS	DOS(Mr Buenneke, Mr Katsapis) , NRO Task Force, USSTRATCOM, NASA	Foreign national governments, regional and local first responders	Provide consequence management advisories (NLT 28 Feb 08); Diplomatic and NASA notifications satellite orbit and Tracking and Impact Predictions (T-4 days and onwards); Publication of Impact Prediction Lines (T-24 hours and onwards)	Estimated Start: Date/Time TBD
Potential Country (Countries) of Impact	DOS	USSTRATCOM, Appropriate COCOM, Interagency Hydrazine Response and Payload Recovery Teams	Foreign national governments, regional and local govts, local population	Conduct Consequence Mgt and payload recovery in foreign nation(s) where debris lands	
Media & US/Intl Public	OASD/PA	OSD (Mr Henry), JCS (Gen Cartwright)	National/International Press	Conduct Press Briefing and/or Issue News Release on Engagement Results	Estimated Start: Date/TimeTBD
DoD members	OASD/PA	OASD/PA (Ms Gleason, Ms Ressler)	Internal Audience	Obtain AFIS, Pentagon Channel Coverage	Estimated Start: Date/Time TBD

QUESTIONS & ANSWERS:

Political/Policy

Who made the decision to engage the satellite?

- The President made the decision to engage the satellite. He did so based on recommendations from his national security advisors in the interest of mitigating the risk to human life from the toxic hydrazine fuel onboard.

Why are you doing this?

- This reentry is not similar to previous reentries for three reasons 1) the amount of material expected to survive reentry, 2) the amount of hazardous material (1,000 pounds of hydrazine), and 3) the fact that we have no control over the satellite, making it impossible to direct its descent.

- The NRO satellite contains about 1,000 pounds of hydrazine fuel encased in a titanium tank. Although we cannot predict where this tank will land, we believe that the tank is likely to survive reentry and break up upon impact, releasing the toxic hydrazine.

- Hydrazine is hazardous. If we do not take this action, there is a small chance that the hydrazine will land in a populated area and cause injury or death.

- Given this risk, we will try to prevent the hydrazine fuel from causing injury or death. Modification of missile defense interceptors is the only option we have available to us. Other options such as using the Space Shuttle to recover the satellite are not feasible.

- If this operation is successful, we anticipate fragmenting the fuel tank, causing the hydrazine to dissipate prior to entering the atmosphere or during its descent. The hydrazine will then not pose a risk to human lives.

- We will choose the time, location, and geometry of the intercept to maximize the probability that we will destroy the hydrazine fuel tank, thereby minimizing the risk from space or ground debris.

When will the engagement occur?

- Regarding the specific timing of the engagement, we have to wait until the satellite is low enough for the modified sea-based interceptors to be able to engage it successfully. As the satellite's orbit continues to decay, we have a window of opportunity to mitigate any potential risks.

How exactly will the US military engage this satellite? With what weapon system?

- To prepare to engage this satellite, we had to make modifications to three sea-based missile defense interceptors, three ships, and the system's command-and-control software. We have not made these modifications to any other missile defense system, nor do we plan to. None of our other missile defense systems have the capability to engage a satellite.

- Any of these interceptors that are not used, the ships and the system's command-and-control software will be returned to their original configuration as a defensive capability.

What is the chance of success?

- We have undertaken extensive modeling, based on all available data, and are confident we understand the requirements for success.

- (If pressed) We will not discuss hypotheticals or speculate on statistical odds of success.

Didn’t earlier statements from U.S. officials indicate that there is very little risk of the re-entry causing harm?

- We have concluded that, although the risk from a natural reentry is not high, we cannot rule out the possibility that the hydrazine fuel could cause casualties on the ground. We will do whatever we can to mitigate this risk.

What other options were considered or are available?

- We could do nothing, allowing the satellite to reenter with roughly 1,000 pounds of hazardous fuel.

- Other options, such as using the Space Shuttle to retrieve the satellite, are not feasible.

- Modification of missile defense interceptors is the only option available to mitigate the risk posed by the reentering hydrazine fuel.

Why are you taking this action now, given that the satellite has been in decay for more than a year?

- We have been monitoring the satellite for more than a year. As reentry approached, we examined alternatives to mitigate the risks to human life.

- Regarding the specific timing of the engagement, we have to wait until the satellite is low enough for the modified sea-based interceptors to be able to engage it successfully. As the satellite's orbit continues to decay, we have a window of opportunity to mitigate any potential risks.

So our missile defense system has a dual role as an ASAT weapon?

- Our missile defense systems were not designed to engage satellites. They are designed only to engage ballistic missiles.

- To prepare to engage this satellite, we had to make modifications to three sea-based missile defense interceptors, three ships, and the system's command-and-control software. We have not made these modifications to any other missile defense system, nor do we plan to. None of our other missile defense systems have the capability to engage a satellite.

- Any of these interceptors that are not used, the ships and the system's command-and-control software will be returned to their original configuration as a defensive capability.

- The U.S. has no need to test kinetic anti-satellite capability. We did so successfully in 1985 and subsequently made the decision that this is a capability that we do not need to have.

How can you criticize China for doing the same thing in January 2007?

- There is no equivalence between China’s anti-satellite (ASAT) test and the President’s decision to mitigate the unique hazards to human life.

- The United States is not doing this to test an ASAT capability. We are announcing our intentions, and we are conducting the engagement with the goal of preventing hydrazine from causing potential harm on the ground.

- In contrast, China deliberately destroyed a satellite in a healthy orbit for the purpose of testing an active ASAT capability. It destroyed the satellite at an altitude of over 800 kilometers, resulting in thousands of pieces of long-lived orbital debris that could remain in orbit for over a century.

- Furthermore, China conducted its ASAT test in secret, without notifying other nations of the risk to other nations' space assets that would be generated by its actions.

- We will choose the time and place of this engagement specifically to minimize the risk resulting from space and ground debris.

- We will choose the time, location, and geometry of the engagement to maximize the chance of hitting the fuel tank and to ensure that the resulting debris will not linger in space for a long period of time and therefore will not present a threat to other nations' satellites.

    - Much of the debris will fall in a few hours.
    - The limited debris will not affect any healthy orbiting space systems
    - Most of the rest of the debris will reenter in several weeks.
    - Most of the reentering debris will bum up in the atmosphere.
    - This engagement will not create significant long-lived debris.

- The engagement point will be chosen also to ensure that the initial debris has very little chance of hitting a populated area. If we are successful, the fuel tank will rupture, and the hydrazine will dissipate before it could cause harm.

How does the debris created by this engagement compare with that generated by China's ASAT test?

- China deliberately destroyed a satellite in a stable orbit for the purpose of testing an anti-satellite (ASAT) capability. It destroyed the satellite at an altitude higher than 800 kilometers, resulting in long-lived orbital debris some of which will remain in orbit well into the twenty-second century.

- By contrast, the U.S. engagement attempt will be conducted at a significantly lower altitude (somewhere below 250 km), avoiding the creation of long-lived debris.

How is the U.S. planning the engagement to minimize debris hazards?

- This engagement will not create significant long-lived orbital debris or additional hazards from re-entering debris.

- We will choose the time and place of this engagement specifically to minimize the risk resulting from orbital and re-entering debris.

    - We will choose the time, location, and geometry of the engagement to maximize the chance of hitting the fuel tank and to ensure that the debris resulting from the engagement will not linger in orbit for a long period of time and therefore will not present a threat to human spaceflight and other space activities.

    - The engagement point will be carefully chosen to minimize the probability that the initial debris re-entering after the engagement will impact a populated area. If we are successful, the fuel tank will rupture, and the hydrazine will dissipate before it can cause harm to human life.

Aren't you really doing this to prevent your satellite technology from falling into the wrong hands?

- No. We are doing this to mitigate the risk could be caused if the satellite's toxic hydrazine fuel were to reenter naturally and impact in a populated area.

Will this set a precedent for other countries to take similar action?

- In a similar situation, we would expect all countries to act transparently and responsibly to reduce risk.
- U.S. actions to engage a falling satellite do not justify the development of offensive anti-satellite weapons by others.

Will this set a precedent for shooting down other objects in the future?

- No. We are doing this to mitigate the risk that could be caused if the satellite's toxic hydrazine fuel were allowed to land.

How is this engagement consistent with past U.S. claims that U.S. space control activities would focus on "temporary and reversible effects" to deny an adversary's use of outer space?

- The U.S. attempt to eliminate the hazard posed by this uncontrollable satellite is an effort to respond to an extraordinary situation to prevent a possible loss of human life.

- The effort to modify Navy SM-3 missiles and Aegis ships for this unique operation focused exclusively on eliminating the threat posed by a large and frozen tank of toxic hydrazine on an uncontrollable and non-functional U.S. satellite.

- The U.S. has no need to test kinetic anti-satellite capability. We did so in 1985 and subsequently made the decision that this is a capability that we do not need to have.

- (If Pressed) The U.S. also has no plans to develop, test, or deploy a dedicated anti-satellite interceptor using the adapted technologies for this project.

Diplomatic

What actions have we taken to notify other nations that we will engage the satellite?

- Nations are being kept apprised of the situation.

- We are notifying our allies and other major space faring nations, as well as nations belonging to the United Nations Committee on the Peaceful Uses of Outer Space, the Conference on Disarmament, and members of the United Nations Security Council. All U.S. diplomatic posts are prepared to answer host government questions regarding the engagement and consequence management preparations.

Has the U.S. been consulting with its partners in missile defense or military space cooperation in preparations for this engagement?

- We are notifying foreign governments worldwide of the President's decision.

- We will also work with foreign governments on preparations for consequence management in the event the engagement attempt does not mitigate the hydrazine hazard.

What has been their reaction?

- I'd have to refer you to the State Department.

What effect will this have on ongoing cooperative missile defense activities, for example with Poland, the Czech Republic, and Japan?

- We have notified our missile defense partners both of our dilemma and of our intended course of action. We expect our ongoing missile defense activities to continue.

- Our bilateral missile defense cooperation programs are a consequence of the proliferation of weapons of mass destruction and ballistic missiles as a means of their delivery. The threat to allies and friends from rogue states is increasing. Missile defenses are critical in defending populations and territory.

- Our allies and friends involved in such missile defense cooperation recognize the threat and are deeply committed to cooperation.

Does the U.S. plan to provide a "satellite intercept" capability to Japan and other nations partnered with the U.S. in the SM-3 missile defense program?

- No. Only three U.S. SM-3 missiles and three ships were modified to eliminate the hydrazine threat on the satellite.

- No additional SM-3s or Aegis ships will be modified with capabilities for satellite engagement.

- Any of these interceptors that are not used, the ships and the system's command-and-control software will be returned to their original configuration as a defensive capability.

Will any of the Ground Based Interceptors deployed in the United States or Poland have an ASAT capability?

- No. The U.S. will not modify any Ground Based Interceptors to make them capable of engaging satellites.

- The U.S. has no plans to adapt any technology from this extraordinary effort on any other current or planned weapon system.

Will the X-band tracking and discrimination radar planned for the Czech Republic be modified for an ASAT capability?

- The U.S. will not modify the X-band radar to make it capable of supporting satellite engagements.

Will this set a precedent for other countries to take similar action?

- In a similar situation, we would expect all countries to act transparently and responsibly to reduce risk of the potential loss of life.

- U.S. actions for this extraordinary engagement can not be used legitimately by others to justify an offensive anti-satellite weapon program.

What role are overseas U.S. space surveillance sensors at RAF Fylingales in the United Kingdom, Thule Air Base in Greenland, the X-Band radar in Shariki in Japan, and sensors at other overseas locations playing in this engagement?

- Overseas sensors will not be used in this engagement. However, such sensors may be used to track debris once an engagement has been made.

In light of past Russian assertions about the hidden ASAT capability of U.S. missile defenses, what additional transparency and confidence-building measures is the U.S. willing to consider to reassure Russia that Ground Based Interceptors or the X-band radar in Europe will not possess an ASAT capability?

- The U.S. has offered numerous transparency and confidence-building measures to assure the Russian Federation that our limited missile defense capabilities planned for Europe are not directed against Russia.

- The U.S. systems proposed for deployment in Europe will not have an ASAT capability.

Will the U.S. re-consider its strong opposition to the Russia's proposal for a "Prevention of Placement of Weapons in Outer Space Treaty (PPWT)"?

- No. For the past 30 years, no U.S. Administration has been able to find a proposal for a space arms control treaty that is verifiable and in the national security interest of the United States.

Does this action herald the start of a new arms race in outer space?

- No. The Cold War is over.
- The U.S. emergency and limited capability for this mission was developed solely to mitigate potential hazards to the population of the Earth.
- By providing prior notification of this engagement attempt, the U.S. is demonstrating its transparency and humanitarian intentions.

Legal

Is this action legal?

- Yes. There is no prohibition under applicable international law to taking this action.
- This extraordinary engagement attempt is being conducted in full compliance with the 1967 Outer Space Treaty, 1968 Rescue and Return Agreement, 1972 Liability Convention, and the 1975 Registration Convention.
- Given the situation we face, we believe taking this action is appropriate and consistent with our role as a responsible space-faring nation.

Who's legally responsible for any damage outside of the U.S. caused by the engagement or the satellite's re-entry?

- The United States is a Party to the Outer Space Treaty and the Convention on International Liability for Damage Caused by Space Objects.
- The U.S., by treaty, has international responsibility for its satellites and space activities.
- The 1972 Convention on International Liability for Damage Caused by Space Objects provides that a party will be "absolutely liable" for damages "caused by its space object on the surface of the Earth or to aircraft in flight." The United States is a party to that convention, so any U.S. liability to other treaty parties would be determined in accordance with its terms.

Does this engagement attempt violate any Congressional restrictions on anti-satellite testing or limitations on modifying missile defense assets for anti-satellite missions?

- No. There are no U.S. domestic law prohibitions against taking this action.

Is this engagement attempt contrary to any voluntary international guidelines on safe space operations?

- No. This engagement attempt is being planned and will be conducted to conform with international guidelines on orbital debris mitigation.

Who will pay for the costs of the clean-up of hazardous materials that might be created by the re-entry of this U.S. satellite?

- The United States expects that it would pay for such costs associated with any hazardous material clean-up that might result from this event.

Technical

What modifications were made to the sea-based missile defense system?

- The Aegis Weapon System has design features that specifically preclude it from intercepting satellites. We have modified three SM-3 missiles, and the radars and command-and-control suites on three ships

Were the modifications significant?

- The data collection, engineering, and analysis efforts were very significant. The changes to the system were accomplished by modifying software within the Aegis BMD System.

How will we monitor the event?

- We will use a diverse set of existing national-level sensors to monitor this event. We will use all of these sensors to monitor the engagement attempt to manage the risks of post-engagement debris.

How and when will we know if this is successful?

- We anticipate having data from the SM-3 missile that will provide immediate indications that the satellite has been hit. We expect to have good indications if we ruptured the tank in the hours and days that follow.

Did you consider using other missile defense interceptors, for example Ground Based Interceptors?

- The mobility of sea-based interceptors gives us the flexibility needed to choose the precise engagement location to ensure a high probability of hitting the satellite and a low probability of creating persistent debris.

Will this engagement interfere with the ongoing Space Shuttle mission?

- No. The engagement will occur after the Shuttle returns to earth.

What analysis of likely debris did you perform prior to this test?

- The Department of Defense conducted extensive analyses in conjunction with leading experts from NASA and other U.S. Government agencies.

- The engagement attempt has been designed to minimize the amount and duration of debris in low-Earth orbit.

How will this engagement affect the International Space Station?

- The risk to the International Space Station (ISS) from this engagement will be very limited. A full 99 percent of the debris resulting from the engagement will reenter the Earth's atmosphere within one week. The cumulative risk to the ISS will be equivalent to only 2-3 days of exposure to the background meteoroid and orbital debris environment. The ISS is now in its tenth year of operation and has not encountered any serious damage due to meteoroids or orbital debris during that time.

How will you ensure that any engagement will not cause hazards to human spaceflight and other space missions?

- The risk that debris from an engagement would pose a unique hazard to human spaceflight dissipates within forty-eight hours after an engagement. As a result, there is no related hazard to the next Shuttle mission scheduled for launch on or after March 11 or subsequent human spaceflight missions.

- The risk to the International Space Station (ISS) from this engagement will be very limited. A full ninety-nine percent of the debris resulting from the engagement will reenter the Earth's atmosphere within one week. The cumulative risk to the ISS will be equivalent to only two to three days of exposure to the background meteoroid and orbital debris environment. The ISS is now in its tenth year of operation and has not encountered any serious damage due to meteoroids or orbital debris during that time.

How does this engagement square with U.S. efforts to take a leadership position in the minimization of space debris?

- The U.S. continues to have the world's strongest domestic regulations for space debris mitigation. The U.S. also continues to support the debris mitigation guidelines developed by the Inter-Agency Space Debris Coordination Committee (IADC) and the United Nations Committee on the Peaceful Uses of Outer Space. This engagement attempt falls well within these sets of international guidelines, since orbital debris from this test will be extremely short-lived.

- (If pressed) International guidelines emphasize the need to minimize the creation of "long-lived" orbital debris which remains in orbit for twenty-five years or longer. The vast majority of debris from a successful engagement attempt will have re-entered within thirty days. By comparison, most debris from China's January 2007 satellite intercept will remain in orbit for at least three decades, but with some remaining debris well into the twenty-second century.

Is there a radiation risk from this satellite?

- No. This U.S. spacecraft contains no nuclear power source and contains no radioactive components.

<u>Consequence Management and Payload Recovery</u>

What is FEMA doing to prepare for an impact in the United States?

- The FEMA Operations Center (FOC) in Washington, DC, is in constant contact with DoD and will notify all States and interagency partners via the National Warning System (NAWAS) with information concerning the reentry of the satellite and debris field once it is known.

- FEMA is coordinating six Federal interagency support task forces comprised of FEMA's hazardous material-qualified Urban Search and Rescue Task Forces, U.S. Department of Health and Human Services (HHS) medical support personnel, Environmental Protection Agency (EPA) and U.S. Coast Guard hazardous material specialists.

- These teams will be immediately available to the States to assist the State(s) in their response. Other Federal assets will be on alert and prepared to respond as needed.

- FEMA has pre-identified a Federal Coordinating Officer (FCO) and has assembled deployable support staff at FEMA Headquarters to lead the Federal response effort.

- FEMA is developing detailed guidance to share with State and local first responders to ensure that all levels of government will be prepared should the satellite impact the United States.

What should somebody do if the object lands in their backyard?

- Any debris should be considered potentially hazardous and should not be touched, handled or moved.

- People who observe or encounter falling debris should notify local emergency responders and stay away from it.

What would the United States Government do if hydrazine or other large pieces of debris from the satellite impact on foreign territory?

- In accordance with the 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space ("Rescue and Return Agreement"), and with the 1972 Liability Convention, the United States is making preparations to take immediate and effective steps to eliminate possible danger of harm should hydrazine or other hazardous materials from this spacecraft return to the territory of another State Party. As the Rescue and Return Agreement provides, these steps would be taken under the direction and control of the State Party within whose territorial limits the hazardous material returns if that state so requests.

- Should there be recoverable debris or component parts that land on the territory of a foreign government, the United States may wish to recover them in accordance with Article 5 of the Rescue and Return Agreement.

What will be the role of the U.S. Government in preparing to manage the consequences of a satellite re-entry?

- The U.S. government plans to track, monitor and plan for the re-entry of this satellite. A U.S. Government Interagency Working Group, comprised of senior officials from the National Security Council, Office of Science and Technology Policy, Department of Defense, Department of State, U.S. Strategic Command, NASA, and Department of Homeland Security, and FEMA has been established to ensure that any actions the U.S. takes are fully coordinated.

Does the U.S. Strategic Command give warning to civilian populations on a point of impact of satellite debris?

- No. It is virtually impossible to predict where and when space debris will impact. This is due to limitations in our tracking system as well as environmental factors, including variations in the gravitational field of the land mass and ocean areas, solar radiation pressure and atmospheric drag.

General Background

How does the United States predict a satellite re-entry?

- Objects are tracked throughout their orbit life. When an object appears to be re-entering within seven days, orbital analysts in the Space Control Center (SCC) will increase sensor tasking (monitoring) and begin to project a specific re-entry time and location. At the four-day point, a monitor run is accomplished once a shift or three times a day. Messages indicating the calculated re-entry time and location are transmitted to forward users and customers (e.g., sensor operators that will be tracking, the Federal Emergency Management Agency, the U.S. Air Force's 14th Air Force) at the four-, three-, two- and one-day points. Starting at the 24-hour point, the object is monitored at the highest level of scrutiny, with processing at the twelve, six and two-hour points. Again, ground traces and messages are transmitted. The object is monitored throughout re-entry.

How does the United States determine that a space object has re-entered?

- We verify that an object has re-entered when the object has three "No Show" sensors verifying the object is no longer in orbit. Once it is determined not to be in orbit, sensor tasking ends and the object is deleted from the "Active" catalogue. The object remains in the inactive catalogue for historical purposes.

Who tracks objects in space?

- U.S. Strategic Command's Joint Functional Component Command (JFCC) for Space, at Vandenberg Air Force Base, California is responsible for tracking man-made objects larger than ten centimeters orbiting Earth. Five three-person crews of orbital analysts work around the clock, 365 days a year, to track these objects constantly. They task a worldwide network of 17 space surveillance sensors (radar and optical telescopes, both military and civilian) to observe the objects.

How many objects have returned to Earth?

- Since tracking began with Sputnik, more than 17,000 (17,218) man-made objects that U.S. Strategic Command tracked have re-entered the Earth's atmosphere.

- There are more than 9,600 (9,620) objects currently orbiting the Earth. U.S. Strategic Command has tracked approximately 26,000 (25,949) objects in its space catalog.

Do you have an estimate of the number of decayed objects that actually hit the ground?

- No. Unless an object is actually found and returned to the U.S. Government, we would have no knowledge of whether or not an object survived re-entry.

What are the chances of someone being struck by an object returning through the atmosphere?

- The chances of someone being struck by a re-entering object are slight.

- The great majority of objects that re-enter disintegrate due to the intense heat created by re-entry into the Earth's atmosphere. Only a small percentage of objects ever re-enter over land since water comprises 75 percent of the Earth's surface. Only about 25 percent of the Earth's landmass is actually inhabited.

What is the debris hazard associated with the re-entry of the satellite?

- If the missile engagement is not successful, analysis indicates that fragments totaling approximately 2,500 pounds (1134 Kilograms) of satellite mass could survive re-entry including 1,000 pounds (453 Kilograms) of hydrazine. In comparison, Skylab fragments totaled approximately 31,000 pounds, or 69,000 kilograms.

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Presenter: Deputy National Security Advisor James Jeffrey, Vice Chairman, Joint Chiefs of Staff Gen. James Cartwright and NASA Administrator Michael Griffin **February 14, 2008**

DoD News Briefing with Deputy National Security Advisor Jeffrey, Gen. Cartwright and NASA Administrator Griffin

GEOFF MORRELL: Good afternoon. Thank you all for joining us today.

As you know, for several weeks now this department and many others in the United States government have been closely monitoring a rapidly decaying U.S. intelligence satellite. Together we've been looking at options to mitigate any possible risks to human life as this -- that could be caused with this satellite reentering the Earth's atmosphere.

Today we've assembled a group from across the government to come in here to explain the course of action that President Bush has selected. You'll hear first from Deputy National Security Adviser James Jeffrey; followed by the vice chairman of the Joint Chiefs, General "Hoss" Cartwright; and NASA Administrator Michael Griffin. Please allow them to finish their statements before chiming in with questions.

And with that, Ambassador Jeffrey?

MR. JEFFREY: Thank you very much. What I'd like to do is sketch a little bit the rationale behind our decision, and then we'll talk more about the details of it.

We first discussed the satellite publicly at the end of January after we had determined that it was coming down and as news reports began breaking. Following further decisions, we have decided to, of course, brief you today. We just finished briefing members and staff of both the House of Representatives and the Senate a little bit earlier today, and we're also doing a diplomatic roll-out across the world this afternoon.

What I'd like to do, again, is to sketch some of the background to the decision. Upon notification of the descending NRO satellite, the president and his national and homeland security advisers reviewed the options available to us to mitigate risk from the descending satellite. As background, I'd like to note that over the past 30-plus years there have been many satellites and other man-made objects falling from space, of course. They have fallen with very little damage and no injuries.

What makes this case a little bit different, however, and in particular for the president in his consideration, was the likelihood that the satellite, upon descent to the Earth's surface, could release much of its thousand-plus pounds of hydrazine fuel as a toxic gas.

The likelihood of the satellite falling in a populated area is small, and the extent and duration of toxic hydrazine in the atmosphere would be quite limited; nevertheless, if the satellite did fall in a populated area, there was a possibility of death or injury to human beings beyond that associated with the fall of satellites and other space objects normally, if we can use that word. Specifically, there was enough of a risk for the president to be quite concerned about human life.

And on that basis, he asked us to review our options.

Apart from the normal consequence mitigation actions that we are prepared to deploy both at home and internationally to deal with the hydrazine, the one viable option we had, we concluded, was to use a tactical missile from an Aegis ship to strike the satellite in order to reduce the overall risk. This missile was designed, of course, for other missions, but we concluded that it could be reconfigured, both the missile and the various other systems related to it, on a one-time reversible basis to do the shot.

After further review of this option, and in particular consideration of the question of saving or reducing injury to human life, the president, on the recommendation of his national and homeland security teams, directed the Department of Defense to carry out the intercept.

Let me talk very briefly about the diplomatic side of this and then I'll turn it over to the vice chairman.

The United States has certain obligations based on treaties and other agreements related to activities in space. The 1967 U.N. treaty on exploration and use of outer space, in particular, calls on states to keep others informed of activities of potential concern.

While we do not believe that we meet the standard of Article IX of that treaty that says we would have to consult in the case of generating potentially harmful interference with other activities in space, we do believe that it is important to keep other countries informed of what is happening. We let many countries know at the end of January that the satellite was descending, that it would likely have hydrazine, and talked a bit about the consequences of that. Today, we're reaching out to all countries and various organizations -- the U.N., some of its subordinate agencies, the European Space Agency and NATO -- to inform them of the actions that we're describing to you today.

With that, I'd like to turn it over to General Cartwright. Thank you very much.

GEN. CARTWRIGHT: Thank you.

Just to re-baseline, this is a National Reconnaissance Office satellite. It was launched on 14 December, 2006. It's about roughly 5,000 pounds in its weight. Historically, a satellite of this size and that weight, roughly half of it would survive reentry.

We're saying in the modeling somewhere around 2,800 pounds would survive reentry.

What is different here is the hydrazine. In this case, we do have some historical background that we can work against for the tank that contains the hydrazine. And we had a similar tank on Columbia that survived reentry. So we have a pretty reasonable understanding that if the tank is left intact, it would survive the reentry.

This satellite essentially went dead for communications and control very shortly after it attained orbit. It was a nominal launch, a nominal insertion into orbit, but then, on orbit, within the first few hours stopped communicating.

A satellite like this -- really, all of our satellites have fuel that is reserved, along with redundant systems, to ensure that there is propulsion to allow for what we would call a controlled de-orbit, but the ability to put it, say, in the ocean. But with no communication with this satellite, that's -- that is what is different here. That's what distinguishes this particular activity, is we have no way to communicate to invoke the safety measures that are already on board the bird.

To take it just a little bit further, hydrazine, in this case -- normal case is that when it's used as rocket fuel, it's in a gaseous state. We bring it up to a liquid state with heaters. This has had no benefit of heaters because there's no power on the bird. So this is a frozen state of hydrazine, which leaves for us another unknown: how much of it would melt on the reentry, therefore would be in either a liquid or gaseous phase.

In a worst-case scenario for the hydrazine, it's similar to chlorine or to ammonia in that when you inhale it, it affects your tissues in your lungs. You know it's -- it has the burning sensation. If you stay very close to it and inhale a lot of it, it could in fact be deadly. But for the most part here, we're talking an area, say, roughly the size of two football fields that the hydrazine could be dispersed over, and you would at least incur something that would make you go to the doctor.

Okay. If you stayed inside that zone, if you got very close to it and stayed, you could get to exposures that would be deadly.

So that's a sense of what we're dealing here with Columbia, and I'll let the administrator talk to that part of it. But with Columbia, the hydrazine tank came down in Texas in a wooded area, unpopulated, and unlike this, we had the mitigating in front of it -- they'd burned most of it. The mission was at its end. So it was almost no hydrazine left. You could walk up very shortly after the event and walk right up to the tank's proximity and it wouldn't have affected you.

Now, we didn't handle it that way. We treated it as a toxic. Anybody who should encounter something like this ought to treat it as a toxic. Don't approach things like this.

Now, having said that, what we tried to do here at the department was to look at the risks that exist for what we will a normal reentry. This is normal for this satellite, not having the ability to de-orbit it. It would basically enter the atmosphere. As I said, it would incur the heating. It may break up. And exactly what the pieces look like, all of that, we're not sure. It's very, very unpredictable as to exactly where it would hit the atmosphere. The atmosphere raises and lowers, based on heating. But when it encounters the atmosphere, then it would come down, as I said, about 2,5(00) 2,800 pounds' worth of mass.

Those calculations and that alone would not be reason to take action. In other words, the likelihood of it hitting the land or a person as a hunk of metal or material is relatively low. It's the hydrazine here that is the distinguishing characteristic.

I've also, like you, read the blogs. This is -- there's some question about the classified side of this. That is really not an issue. Once you go through the atmosphere and the heating and the burning, that would not be an issue in this case. It would not justify using a missile to take it and break it up further.

Our objective here was to reduce the risk -- could we reduce the risk to space platforms, to airborne platforms, and to terrestrial platforms -- the Earth, cities, people, et cetera.

In the first case, one of the first actions that we took together was we believe that the window that we were looking at to

intercept this vehicle can be accomplished after we bring the Shuttle down. So we're going to bring the Shuttle down before we even consider this option.

The second is that we looked at the various capabilities that we as a nation hold, and what held the highest likelihood of success for us was to move to a mobile platform and a tactical weapon which we have good understanding of the performance of the weapon. That came to the standard missile -- Navy missile that has been in the inventory for several years, has a very solid track record. We understand how to use it and how it works and what its likelihood of performance would be. In addition, it has a mobile platform. And the intent in the mobile platform is what we would like to be able to do is to intercept this missile at a point at which we could have a high likelihood of bringing it down in an unpopulated area.

Second objective is to hit the tank, the hydrazine tank, and rupture it so that we can off-gas this hydrazene as early as possible so the least amount of it returns to the Earth, okay.

So those are the two key objectives. It is looking at the likelihood of mitigating on orbit, in the air or on the land.

On the orbit side, in space, what we're attempting to do here is to intercept this just prior to it hitting the Earth's atmosphere. That does two things for us. It reduces the amount of debris that would be in space -- so in this case, what we're looking for it to try to have the debris, over 50 percent of it within the first two orbits or the first 10 or 15 hours would be de-orbited. The second piece here is looking at other, unmanned bodies in space, in low-Earth orbit, and the space station to make sure that we did not increase the risk to other bodies in space. So that was a criteria we're trying to understand.

Next is when the orbit comes down through the air, is there anything that would increase the risk to normal, general aviation. We have a set of standards -- the FAA has a set of standards that it uses to re-vector aviation when there is a hazard in the air.

Would we cause a hazard in the air? If we did, would it be predictable enough that we could re-vector? That was a criteria we had to get through.

And then the last criteria was on earth, can we, in any way, help mitigate the opportunity for this to come on land, to land in a populated area?

And so we worked our way through those, and I'll let the director talk to the space side of this equation. But suffice it to say, we believe that if we intercept this just prior to entry, and remember, this is not an aerodynamic body. If it were a ballistic missile and had aerodynamic properties, you could see it rising in one hemisphere and predict where it's going to come down in the next. And therefore that's how you'd accomplish an intercept.

This has no aerodynamic properties. Once it hits the atmosphere, it tumbles; it breaks apart; it is very unpredictable and next-to- impossible to engage. So what we're trying to do here is catch it just prior to the last minute, so it's absolutely low as possible, outside the atmosphere, so that the debris comes down as quickly as possible, A). B) On the intercept, first, if we can hit the satellite, which we believe we have a high confidence we can do, that will slow the satellite down, which means it'll deorbit more quickly, and we can predict more accurately where it will deorbit, so we can potentially put it in a position in the ocean.

On the land side of the equation, again, objective would be to breach the tank and let the hydrazine escape. Second is to break apart the satellite, at least, so that the pieces can burn up on reentry a little easier, and we bring them down quicker. The last piece on land, we talked through a little bit, where we have an extensive program that we use regularly with deorbiting bodies, that notifies the world that we have something coming in, but this is highly unpredictable.

Again, they're not aerodynamic. So we can generally get a quadrant of the earth, you know, down to the last day. But it's down to the last one or two hours before we can tell you potentially a land mass, but not more accurately than that. So this is very difficult, because you have a very non-aerodynamic body trying to move through the air.

A couple of the other pieces here, to help put a little finer point on some of these. We're using the Standard Missile 3, well understood. It has the ability to get up just beyond the atmosphere, so it has the kinetic energy to be able to reach this satellite as it prepares to reenter.

We believe that the window for this activity will start here in the next three or four days. And we will be open for about maybe as many as seven or eight days.

Much of this depends on the heating of the atmosphere. So we're trying to build, knowing that, where would the best position be from the Earth to launch a missile to intercept that would drive this down into the ocean? And that's our objective, get rid of the hydrazine and have this fall in the ocean.

We'll use one missile with two back-ups. We'll have three ships on station, but it'll be one shot. The other missiles are there principally in case something in the launch phase does not work. We will have radars and space sensors pointed at the area so that we have some sense of whether we were successful or not.

In the case that we're not successful with the first shot, we'll reassess, but two things will be working against us. One, the satellite will continue to progress across the Earth, and so, as it does, we'll only have a certain of amount of time before if we shot we'd have a higher likelihood of bringing it down on land, and we're not going to shoot if that's the case.

We have to be able to assess if parts of the satellite came apart is the -- which part is which, and that's a very difficult thing to do. In other words, if the satellite grazed but did not directly impact, how do you decide whether you should take a second shot? And we'll work our way through that, but it'll be a conscious decision that we'll take.

We'll have a window, we believe probably might get as much as two days to make an assessment and come back before we really find it not feasible to reengage this target and to let it normally decay in its orbit. So it's a relatively small window. We'll take one shot and assess, and then we'll come back and look.

We feel confident that we will be able to assess, but this is not necessarily something that will occur in minutes. And that's the challenge, is to try to understand what it is we have after we've taken the shot, and what it'll take to come to the calculus that would say go ahead and reengage again, or reengagement will either increase the risk to space, increase the risk to the air, or increase the risk on the ground. If either -- any of those are the case, then we will not take a second shot.

At the end of this, just from my perspective, what to me was compelling as we reviewed the data is that if we fire at the satellite, the worst is that we miss, and then we have a known situation, which is where we are today.

If we graze the satellite, we're still better off because likely we'll still bring it down sooner and therefore more predictably. If we hit the hydrazine tank, then we've improved our potential to mitigate that threat. So the regret factor of not acting clearly outweighed the regret factors of acting. And as long as that's the case, we felt that the responsible activity was to go ahead and try to engage the satellite.

I'll turn it over to the director for his comment. I'm sorry -- administrator.

MR. GRIFFIN: Administrator, director, what difference?

GEN. CARTWRIGHT: (Chuckles.)

MR. GRIFFIN: My colleagues have said almost everything that would need to be said. I'll add a couple of quick remarks.

The first is that of course we've already alluded to the fact that we have a shuttle on orbit at the moment and a space station on orbit permanently with a permanent crew. So we looked very carefully -- from the first, NASA has been involved in this -- we looked very carefully at increased risks to shuttle and station, and broadly speaking, they are negligible. They are at least a factor of 10 smaller than risks we take just being in space anyway in the Shuttle. So they are not significant with respect to the risks we already assume to fly the Shuttle. On the space station, of course, it's a different issue. The space station is much more robust than the Shuttle. But even there the risk posture does not increase significantly. And so we are very comfortable that this is a decision made carefully and objectively and safely.

There are good times to conduct the intercept and poor times to conduct the intercept, based on the positioning of the station, and I and my colleagues will work together to make sure that, if possible, we pick one of the good times. But even the bad times are not too bad, and I would assure all of you that we've -- we're conducting this with due regard to the safety of people on orbit.

I would make the point that -- I would want to reinforce the point that General Cartwright made, is that there is a very large amount of uncertainty in predicting the landing zone of an entry object. It's generally acknowledged by specialists in the field that the best you'll do is to get within around 10 percent of the remaining lifetime of the bird, and that's the best.

So, a month ahead of time, you will know when it will land within about three days. That, of course, allows the satellite to make multiple revolutions around the entire surface of the Earth. So in essence, a month ahead of time, you have no idea. Ten days ahead of time, you'll be uncertain by at least a day.

Again, it will make 16 revolutions around the Earth in that day. It could land anywhere. On the day that you land, you will be uncertain by several hours. The satellite will make at least two orbits in that period of time, which again, sweeps out a very large fraction of the Earth.

So it was necessary to make the decision about whether to engage days, weeks, even longer, if possible, ahead of when it will actually land, because it is simply not possible to predict whether it will land in the middle of the Pacific or in a populated area. The decision had to be made before we could be certain where it would go.

I would also -- I would to again emphasize General Cartwright's point that almost anything that we can do with this turns out to be either neutral or better. Neutral is if we miss. Nothing changes. If we shoot and barely touch it, the satellite is at this point just barely in orbit. Almost anything that you do to it when it is just barely in orbit is going to cause it to reenter within the next couple of orbits. And of course, if we shoot and get a direct hit then that's a clean kill and we're in good shape.

So there is almost nothing we can do here that makes it worse. Almost everything we can do, technically, makes it better, which was a very strong factor weighting the decision. With that, I will close. I don't think we need anything more.

Q Just to ask you a couple quick questions, first of all, you said you have a high confidence that you can do this. Is this a first? Does it employ the same technology you use in missile defense? And will you learn anything relevant to missile defense from

this? And how much space debris will be left behind if you're successful?

GEN. CARTWRIGHT: On the first side of the equation, this is the first time we've used a tactical missile to engage a spacecraft, but not the first time that we've used a tactical missile to engage a body that is just reentering, okay. So the leap to move to catching it just before it hits the atmosphere really takes almost no modification at all. What we're talking about here is minor modification to software, both in the system that -- the Aegis system and in the missile itself. So that gives a reasonably high confidence that we understand all of the activities here.

Q What was the previous attempt?

GEN. CARTWRIGHT: Well, the missile is designed to -- this particular missile, the standard missile, is designed to intercept short- and medium-range ballistic missiles.

They leave the atmosphere for a short period of time and come back.

Q (Off mike) -- missiles, not satellites.

GEN. CARTWRIGHT: That's correct. So we have the experience there. What we're trying to do is match up that period at which the satellite looks most like a reentering missile. And so that gives us some sense that all of the work that's been done, the test data that we have would -- over the years and the operational data would be transferable to this activity. But it also makes the window very short for when we could intercept.

Q So it does use missile defense technology.

GEN. CARTWRIGHT: It uses the missiles technology, missile defense, and this is a defensive missile. The standard missile is the defensive missile. But it does not use that portion of it which is associated with the atmosphere. It uses that portion --

Q And what about space junk? Space debris.

GEN. CARTWRIGHT: Space debris. Again, the lower we can catch this, the quicker the debris reenters, what we're looking for is to catch it here very close to the Earth's surface. What we're shooting for nominally is about 130 miles up. Those are nautical miles. And these numbers get confusing because some people use kilometers and some people -- but 130 nautical miles is what we're trying.

In doing that, well over 50 percent of the debris will come in in the first two revolutions. And so then we're talking weeks, maybe a month for some of the smaller debris to come down, but it's a very finite period of time that we can manage. And it's in an area where we don't have satellites, manned or unmanned. In other words, down very low.

Q General, first of all, what are the odds, what is the percentage chance that you will succeed and -- high, low, 70, 80 percent -- that you will actually hit?

And secondly, obviously the U.S. criticized China pretty heavily for their anti-satellite test. What makes this different? And is this just sort of a resurgence of what has been in past a years a U.S. anti-satellite program?

GEN. CARTWRIGHT: Let me start with kind of the first piece here of -- this missile and what's different here is, one, we are notifying, which is required by treaties and law. Okay? And we've started that notification well over a month ago and we're continuing to keep people informed. And we have a consequence management plan that is in place that will execute.

The second here is, in looking at comparisons, this is right at the surface of the atmosphere, so to speak. Other intercepts that have occurred have occurred substantially higher than the space station, as an example. And that means the debris is up there for 20 to 40 years and has to migrate down through both manned space platforms and unmanned space platforms. That will not be the case here.

So those are the types of things that we looked at. Percentage- wise, percentage that the missile will function normally, very high; percentage that, if it functions normally and gets to the altitude that it would intercept, again, I would give you very high based on what we know and that this is a well-understood asset.

Q High? Eighty? Ninety?

STAFF: (Off mike.)

Q (Could you repeat that ?).

GEN. CARTWRIGHT: I'll go closer to yours. (Soft laughter.)

MR. GRIFFIN (?): I would just comment that the Chinese ASAT test was conducted against a satellite in a circular orbit at around 850 kilometers of altitude. So the debris that was generated could go maybe not anywhere but a very large swath of Earth orbital space and will be up, as General Cartwright said, for decades. All of the debris from this encounter, as carefully designed as it is, will be down at most within weeks, and most of it will be down in the first couple of orbits afterward. There's an enormous

difference to spacefaring nations in the conduct of those two things.

Q General, where are these ships going to be located when this attempt is made? And you can't move them around in the space of two or three days, but --

GEN. CARTWRIGHT: We're holding that close just for the reasons -- we're still working the box. We're down in an area, but I will give you the Northern Hemisphere and the Pacific, and that's about as close as I want to draw it right now.

Q General, would there be no danger if you didn't do this and this came down on land and somebody else got to it first and it landed in -- you know, somewhere in China, if -- this -- that this would be of no intelligence value to the country that --

GEN. CARTWRIGHT: I mean, our assessment is high probability that it would not be of any intelligence value. Just the heating, the destruction that occurs on the reentry would leave it in a state that -- you know, other than some rare unforecast happenstance, this would not be of intelligence value.

Q But is that rare possibility, that maybe remote possibility -- is that part of the calculation here?

GEN. CARTWRIGHT: No.

Q It's not? (Off mike) --

GEN. CARTWRIGHT: It would not change. It is the hydrazine that makes this different. Now, I mean, I've read the blog space on this, and I understand. But it is hydrazine that we are looking at. That is the only thing that breaks it out and is worthy of taking extraordinary measures.

Q General, I've got a quick follow-up to Jamie's question, and then I have a separate question. Are these missiles that are being used in this shoot part of the missile defense system?

I just wanted to clarify that.

GEN. CARTWRIGHT: The Aegis is part of the regional/tactical system of missile defense, and it is netted into the broader system from a sensor standpoint.

Q Okay. And then in terms of the shuttle's hydrazine tank that survived the reentry and landed on Earth -- but when the shuttle first reentered, that was a controlled reentry.

GEN. CARTWRIGHT: Right.

Q This reentry would be -- even if you don't hit it, is going to be much more violent. Wouldn't the percentages or the possibility that it would tear itself apart and destroy that hydrazine tank in the atmosphere increase with that?

GEN CARTWRIGHT : No.

MR. GRIFFIN: No. The analysis that we've done is as certain as any analysis of this type can be. The hydrazine tank will survive intact, and in fact the hydrazine which is in it is frozen solid, as it is now. Not all of it will melt, okay? So you will land on the ground with a tank full of slush hydrazine that would then later evaporate. The tank will have been breached -- not probably, but the tank will have been breached, because the fuel lines will have been ripped out of the main spacecraft, and so that hydrazine will vent.

If it lands in a populated area -- the general referred to an area the size of a couple of football fields, and loosely that's what our analysis shows -- it's hard to find areas that have any significant population to them where you could put a toxic substance down across a couple of football fields and not have somebody at risk. And so we didn't want to create a situation like that. So in brief, the tank will survive, it will be breached, the hydrazine will reach the ground, and that's not an outcome we want to see.

Q Thank you. Can you any of you gentlemen put into layman's terms the difficulty in hitting this satellite with one of these tactical missiles?

GEN. CARTWRIGHT: What you're attempting to do here -- correct me if I'm wrong, but -- I think the closing velocities that we're talking about here, in rough order of magnitude, are about 22,000 miles per hour. So we're at the end of the boost of this missile, in a very small box, trying to make sure that the sensor can detect the satellite and then maneuver sufficiently to accomplish that intercept. That's a challenge.

But I go back to the earlier discussions -- we have a missile that's well-understood and well-known and has a good track record here, and a sensor that is part of it. The modifications have been to make it look for something like this satellite in software. And so we have a pretty good idea that we would have a reasonably high opportunity for success. But having said that, we looked at, so what happens if we don't or what happened -- what could be the worst downside? And in each case, we really came away with we're better off taking the attempt than not.

Sir, in the back?

Q Sir, can you -- have you done something similar in the past? And I also would like to know, how do you brief the international community throughout some organization or how do you do it?

MR. JEFFREY: I'll take that.

As I said, we'd already reached out, at the end of January, to a large number of nations that do have programs that do have programs in space, to give them an alert. We began preparing for international response in the case of the hydrazine coming down as well, and alerted our Homeland Security here.

What we're doing today is to reach out to the various U.N. organizations, the U.N. headquarters itself and essentially the entire international community, through capitals, to let them know more details about the satellite coming down, and about our plan to intercept it. And, of course, these countries may or may not have comments. They may or may not have supportive statements, and we'll see.

But we believe in an exchange of information. We believe in keeping them informed and we believe that we will live up to all of our international obligations in the 1972 and in other treaties.

Q As far as the actual dangers of hydrazine, can you help us understand, if you were to inhale it, how quickly would damage begin to happen, such that you needed hospitalization? And how quickly would damage happen such that you could be at risk of dying?

GEN. CARTWRIGHT: Very difficult in that it implies that you know what the concentration is, but you could find yourself very close. In a high-concentration area, as an example, you're still talking about minutes that you'd have to recognize a situation, remove yourself and have enough time to move away from the situation, if you really knew what you were dealing with. The worst scenario is that you have a person who either is not mobile or does not, for whatever reason, sense that they're in danger, and therefore doesn't take any action. But those variables are very difficult to put minutes or time to.

But we do believe that if you're in this area, and we're talking roughly two football fields, on a standard day with a certain amount of wind -- I mean, all of these are calculations that will change with every place on the earth -- that you're at risk to an extent that you'll have recognized that you're in trouble. You'll start to walk to where you feel like you're better off, and you'll still need to see a doctor. And that's as close, and if you stay and you're not ambulatory for whatever reason, and you stay in a concentrated area, you could eventually get yourself to a point where death would follow.

Q Short of death, what would be the other health risks you could have that could happen with short exposure?

GEN. CARTWRIGHT: Burning sensations, damage to tissue in the lungs.

Q General Cartwright, can I just -- two questions. Just to clarify, the Shuttle’s schedule will be altered.

GEN. CARTWRIGHT: No, no, no.

The window of engagement is nicely compatible with the nominal end of the Shuttle mission. We expect to have the shuttle down in the normal course of events, even extending it by a day as we plan to do, before we need to engage.

Q My other question is, can you describe what this satellite did, what it was, what its purpose was? Why was it up there?

GEN. CARTWRIGHT: It was a test bird launched by the National Reconnaissance Office. I would direct you towards them. That's as much as I can go into it.

Q The reason why I ask is because, as you say, you've read the blogs and you've read the comments about the classified material aboard. So presumably there is some high-level classified information technology on the satellite.

GEN. CARTWRIGHT: I'll direct you to the National Reconnaissance Office.

Q To extent that -- to no extent this was an answer to the Chinese anti-satellite tests; this is not to prove that the U.S. can also do this? That was not part of your consideration?

GEN. CARTWRIGHT: This is all about trying to reduce the danger to human beings. That was a decision that was taken by the president after listening to all the technical arguments you've heard today. That was the calculation: hydrazine equals hazard to human beings, and we tried to do what we could to mitigate it.

GEN. CARTWRIGHT: But also remember that we did that 20 years ago. There's really no need to go back to that data point. And this is not like that test in technical terms and in terms that talk about the preservation of human life.

Q General, can I ask, on the satellite itself, to be clear, a lot of the taxpayers are going to want to know, why did this thing fail within hours? Was this the Lockheed experimental satellite?

GEN. CARTWRIGHT: Again, it wasn't -- it's the National Reconnaissance Office's satellite. I'd direct you to them about its

function and its failure mode, other than to tell you that there is no power, so it was unresponsive.

Q Was this -- it went into a safe mode because it has a software malfunction? Is that the --

GEN. CARTWRIGHT: We don't know even know that it's in a safe mode. In other words, it is totally unresponsive. So a safe mode implies that you can fly without running into your neighbors, so to speak. This is a totally unresponsive satellite.

Q Well, Ambassador Jeffrey, I mean, this was a malfunction. This wasn't an act of God or it was up there for years; it was a malfunction shortly after orbit. Is the White House or Pentagon looking at culpability or liability to the contractor on this? Because you're taking extraordinary measures to deal with a flawed bird up in space, and I think taxpayers are going to want to know who's going to get, you know, nailed for this besides the satellite?

MR. JEFFREY: For the moment, we're focusing on what's right in front of us, which is to try to mitigate the problems with the hydrazine coming down. And you know, we'll continue to review why this happened and what to do about it.

Q Who built the satellite? Who built this one, Lockheed or Boeing?

Q You must know that. Jeffrey -- Ambassador Jeffrey?

MR. JEFFREY (?): I don't --

Q General, our understanding -- Space News says the NRO did not recommend that the satellite be destroyed. Is that correct?

GEN. CARTWRIGHT: Not to my knowledge. They were very much a part of this team.

They did much of our analysis on debris and on consequence, contributed largely to understanding what the mechanism would be if we were to intercept and the likelihood of success. I mean, I don't want to speak for them, but they were very much a part of this decision.

Q General, can you came the three ships that are going to be involved in this?

GEN. CARTWRIGHT: Prefer prefer not to.

Q Are they the Curtis Wilbur, the Fitzgerald and the Shiloh? (Laughter.)

GEN. CARTWRIGHT: (Chuckles.) Prefer not to.

Q Would I be wrong if I said it was the Curtis Wilbur, the Fitzgerald and the Shiloh?

GEN. CARTWRIGHT: Questions? (Laughter.)

Q General, if this shot is successful, would it be fair for the international community to regard the standard missile now as an anti-satellite-capable weapon? And have you dealt with that issue in the international community already?

GEN. CARTWRIGHT: A fair question and a good question. One, this is a modification to the SM-3. In other words, this modification can't coexist with the current configuration. So it's a one-time deal. Does it have the kinetic capability? That's why we picked it. But you'd have to go in and do modifications to ships, to missiles, to sensors and they would be significant. This is an extreme measure for this problem. It would not be transferable to a fleet configuration, so to speak.

Q Are you going to have any support of the military internationally? I mean, as a backup or something? Are you going to have the support of some other countries militarily just as a backup?

GEN. CARTWRIGHT: Let me -- let me go at it this way. The space network that we use to track (inaudible). is an international network. And so from that perspective, people are helping us to make sure we know what the position -- what we would call the ephemeris data is, because that is a global network of many nations. From the standpoint of the missile itself and the ships, that is an American effort.

STAFF: Let's take a couple more.

Q Could you go back to the second part of my question, though, that I didn't really get an answer to, dealing with the international feedback?

GEN. CARTWRIGHT: I'll come back.

Q Thanks. The international feedback on whether this is going to be regarded as an ASAT weapon.

Q General, could you give you some idea of the size of the spacecraft and what the modeling shows might be -- how big the pieces that survive -- would they -- would the tank be the biggest? And how big is that?

GEN. CARTWRIGHT: I'll just get -- it's 5,000 pounds, and probably think more along the size of a bus than a pickup truck. The largest piece from the modeling standpoint -- (off mike) --

MR. GRIFFIN: (Off mike) -- the tank is, it will be the largest intact piece with high confidence. I mean, one can never be certain and the tank is about, what, 40 inches across or something very close to that. It's a spherical tank.

GEN. CARTWRIGHT: I'm sorry, I'll come back.

Q No, I'm sorry. Just wanted to see, again, the second part of my question, whether there has been some concern expressed in your diplomatic outreach from any countries about the potential that the standard missile could be used again in the future as an ASAT weapon.

MR. JEFFREY: We haven't of course gotten the feedback yet because we've just gone out today. And I would be very reluctant, over a 30-year career, to predict what one of several hundred countries and international organizations might react to. What I do know is the truth. I know why we're doing this. As explained today, we're very firm in this. We all know why the decision was taken, and we stand by it.

(Cross talk.)

Q Do you have an estimated price tag, General, an estimated price tag for this operation, and for the satellite itself?

GEN. CARTWRIGHT: I'd have to go back to the NRO on the satellite.

The price tag associated with the missile, if we use one missile, I'd have to go back and dig out the cost. But we've spent about three weeks in modification to software. You'd have to kind of calculate the dollars and cents associated with that. But it is an existing round, so we're not off building something new, and we'll get you the cost of a Standard Missile.

Q I mean, the entire operation, not just the missile. There's a lot of manpower and everything else.

(Cross talk.)

Q We're going to call the NRO today, and they're going to blow us off, saying it's classified. Can you or Mr. Morrell direct them to give us the name of the contractor and the cost of the satellite roughly? The public deserves an answer on this, because you're taking extraordinary measures to shoot this thing down.

GEOFF MORELL: Your interest is noted, Tony.

All right, thank you.

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AMERICAN FORCES PRESS SERVICE
NEWS ARTICLES

Navy to Shoot Down Malfunctioning Satellite

By Jim Garamone
American Forces Press Service

WASHINGTON, Feb. 14, 2008 – The Navy will shoot down a malfunctioning U.S. spy satellite sometime after Feb. 20, government officials said during a Pentagon news conference today.

Ambassador James F. Jeffrey, assistant to the President and deputy national security advisor, said President Bush decided to bring down the satellite because of the likelihood that the satellite could release hydrazine, a toxic chemical used as a maneuvering fuel.

Michael Griffin (right), administrator of the National Areonautics and Space Administration, comments on a proposed attempt to destroy an unresponsive U.S. reconnaissance satelite just as it enters the Earth's atmosphere, during a news briefing at the Pentagon, Feb. 14, 2008. Griffin, joined Marine Gen. James E. Cartwright (center), vice chairman of the Joint Chiefs of Staff, and Ambassador James F. Jeffrey, assistant to the president and deputy national security advisor, is discussing details of the planned operation. Photo by R. D. Ward
(Click photo for screen-resolution image);high-resolution image available.

"The likelihood of the satellite falling in a populated area is small, and the extent and duration of toxic hydrazine in the atmosphere would be limited," Jeffrey said. "Nevertheless, if the satellite did fall in a populated area, there was the possibility of death or injury to human beings beyond that associated with the fall of satellites and other space debris."

The window for shooting down the satellite opens in the next three or four days and remains open for as many as seven or eight days, said Marine Gen. James E. Cartwright, vice chairman of the Joint Chiefs of Staff.

NASA Administrator Michael Griffin said the study group looked carefully at increased risks to the shuttle and International Space Station and decided they are negligible. "We are very comfortable that this is a decision made carefully, objectively and safely," Griffin said.

Still, the Navy will not fire until after the shuttle Atlantis mission ends Feb. 20.

In late January, the U.S. government notified other nations that the satellite was unresponsive and would make an uncontrolled reentry in late February or early March.

The Navy has modified three SM-3 missiles aboard Aegis ships to strike the satellite, Cartwright said. The Navy wants to intercept the satellite at a point just above the atmosphere so there would be a high likelihood of bringing it down in an unpopulated area. An intercept also would rupture the hydrazine tank. The vice chairman would not say exactly where the ships would fire

from, only saying it will be from the northern hemisphere and the Pacific Ocean.

Intercepting the satellite at about 130 nautical miles altitude will reduce the risk of debris in space. Once the satellite is hit, officials hope 50 percent of the debris will come to Earth in the first two orbits and the rest shortly thereafter, Cartwright said.

The satellite belongs to the National Reconnaissance Office and was launched Dec. 14, 2006. It weighs roughly 5,000 pounds, and computer models show that roughly 2,800 pounds would survive reentry. “What is different here is the hydrazine,” Cartwright said. “In this case, we have some historical background that we can work against for the tank that contains the hydrazine. We had a similar one on Columbia that survived reentry. We have a pretty reasonable understanding that, if the tank is left intact, it would survive the reentry.”

The tank is circular with a radius of 20 inches. It holds about 1,000 pounds of the fuel.

While details of the satellite are classified -- DoD officials will not release who built it or how much it costs -- that had no bearing on the decision to shoot it down, Cartwright said. The temperatures from reentry would burn up any classified system on the satellite, he said.

Hydrazine is similar to chlorine or ammonia in that it affects lung tissue. People inhaling it would feel a burning sensation. “If you stay close to it and inhale a lot of it, it could be deadly,” Cartwright said.

If the military did not shoot down the satellite, the hydrazine would disperse over an area roughly the size of two football fields, the general said. Those who breathed it would need medical attention.

“As we reviewed the data, if we fire at the satellite, the worst that could happen is that we miss,” Cartwright said. “Then we have a known situation, which is where we are today.”

Grazing the satellite would probably still bring it down quicker and more predictably, he said. “If we hit the hydrazine tank, then we’ve improved the potential to mitigate that threat,” he said. “The regret factor of not acting clearly outweighed the regret factor of acting.”

Statement by Ambassador Christina Rocca, Permanent Representative of the United States to the Conference on Disarmament

Geneva,
February 15, 2008

Thank you, Mr. President.

In the interests of transparency, I have requested to take the floor this morning to address a matter of interest to the Conference, consistent with the provisions of the 1967 Outer Space Treaty and in the spirit of international cooperation.

The United States of America wishes to inform the Conference that the President of the United States has authorized the U.S. Department of Defense to attempt the engagement of an inoperable National Reconnaissance Office (NRO) satellite, which is currently in a decaying orbit. The President determined that protecting against the possible risk to human life was paramount. The highly-toxic nature of the satellite's fully fueled hydrazine tank, which would likely survive in a natural re-entry, was the key factor influencing this decision.

We have recently modified three SM-3 missiles and three U.S. Navy ships to perform this mission. If this engagement is successful, we anticipate rupturing the fuel tank, and causing the hydrazine to dissipate, so that it will no longer pose a danger to human life. We will choose the time, location, and geometry of the engagement to maximize the chance of hitting the fuel tank and to ensure that the resulting debris will re-enter quickly and thus not pose a danger to satellites and peaceful space operations. Additionally, the engagement point will be carefully chosen to minimize the chance that any initial debris re-entering after the engagement will impact a populated area.

If the engagement fails, the NRO satellite is expected to make an uncontrolled re-entry into the Earth's atmosphere on or about March 6, 2008. At present, we cannot predict the entry impact area, which could occur in any region on the Earth's surface between 58.5 degrees North and 58.5 degrees South latitudes. If the engagement attempt fails, we are examining options for consequence management to mitigate the hazards that could be created if a fully fueled hydrazine tank were to land in an inhabited area.

Whether the engagement succeeds or fails, the U.S. is prepared to offer assistance to governments to mitigate the consequences of any satellite debris impacts on their territory. The U.S. does not require assistance from other governments for tracking or for re-entry prediction.

The 1972 Convention on International Liability for Damage Caused by Space Objects provides that a party will be "absolutely liable" for damages "caused by its space object on the surface of the Earth or to aircraft in flight." The U.S. is a party to that convention, so any liability to other treaty parties would be determined in accordance with its terms.

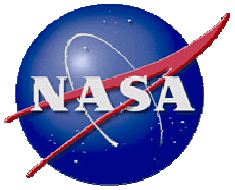
Should there be recoverable debris or component parts that land on the territory of a foreign government, the U.S. may wish to recover them in accordance with Article 5 of the 1968 Agreement on the Rescue of Astronauts and the Return of Objects Launched into Outer Space.

All actions regarding this matter will be consistent with the provisions of the 1967 Outer Space Treaty.

Our transparency in notifying foreign governments and the broader international community is consistent with our commitment to safe and responsible space operations. This extraordinary engagement is an emergency response to prevent the possible loss of life. This engagement is not part of an anti-satellite development and testing program, and we do not intend to retain the technical capability resulting from the modifications required to carry out the engagement.

The United States is prepared to further discuss this subject in the Conference on Disarmament in the interests of transparency.

Thank you, Mr. President.

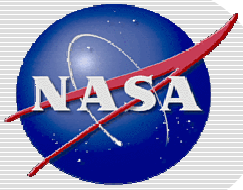


Space Debris Assessment for USA-193

Presentation to the 45th Session of the
Scientific and Technical Subcommittee
Committee on the Peaceful Uses of Outer Space
United Nations

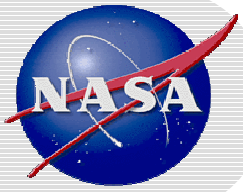
11-22 February 2008

Presentation Outline



- **Potential Space Debris from USA-193**
- **Space Debris Mitigation Guidelines of COPUOS STSC and the IADC**
- **Orbital Longevity of Debris**
- **Risk to Space Operations**

USA-193 Debris Cloud

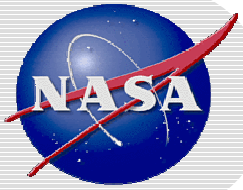


- **To be compliant with the COPUOS STSC and IADC space debris mitigation guidelines and to minimize any effect on the near-Earth space environment, the kinetic engagement of USA-193 would occur shortly before a natural reentry and at an altitude below 250 km.**

- **More than 50% of the debris created will not be orbital and will enter the Earth's atmosphere within 45 minutes of the event.**

- **Of the debris left in temporary orbits about the Earth, more than 99% will fall out of orbit within one week of the event.**

COPUOS STSC Space Debris Mitigation Guidelines



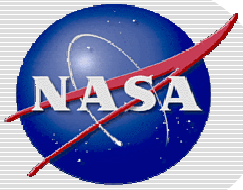
- **Guideline 4 of the COPUOS STSC Space Debris Mitigation Guidelines addresses those rare cases when "intentional destruction and other harmful activities" might be necessary:**

  "Recognizing that an increased risk of collision could pose a threat to space operations, the intentional destruction of any on-orbit spacecraft and launch vehicle orbital stages or other harmful activities that generate long-lived debris should be avoided.

  "When intentional break-ups are necessary, they should be conducted at sufficiently low altitudes to limit the lifetime of resulting fragments."

- **Under the plan to neutralize the USA-193 spacecraft, the event will take place at a very low altitude and will result in space debris with extremely short orbital lifetimes to be <u>fully compliant</u> with Guideline 4 of the COPUOS STSC Space Debris Mitigation Guidelines.**

IADC Space Debris Mitigation Guidelines



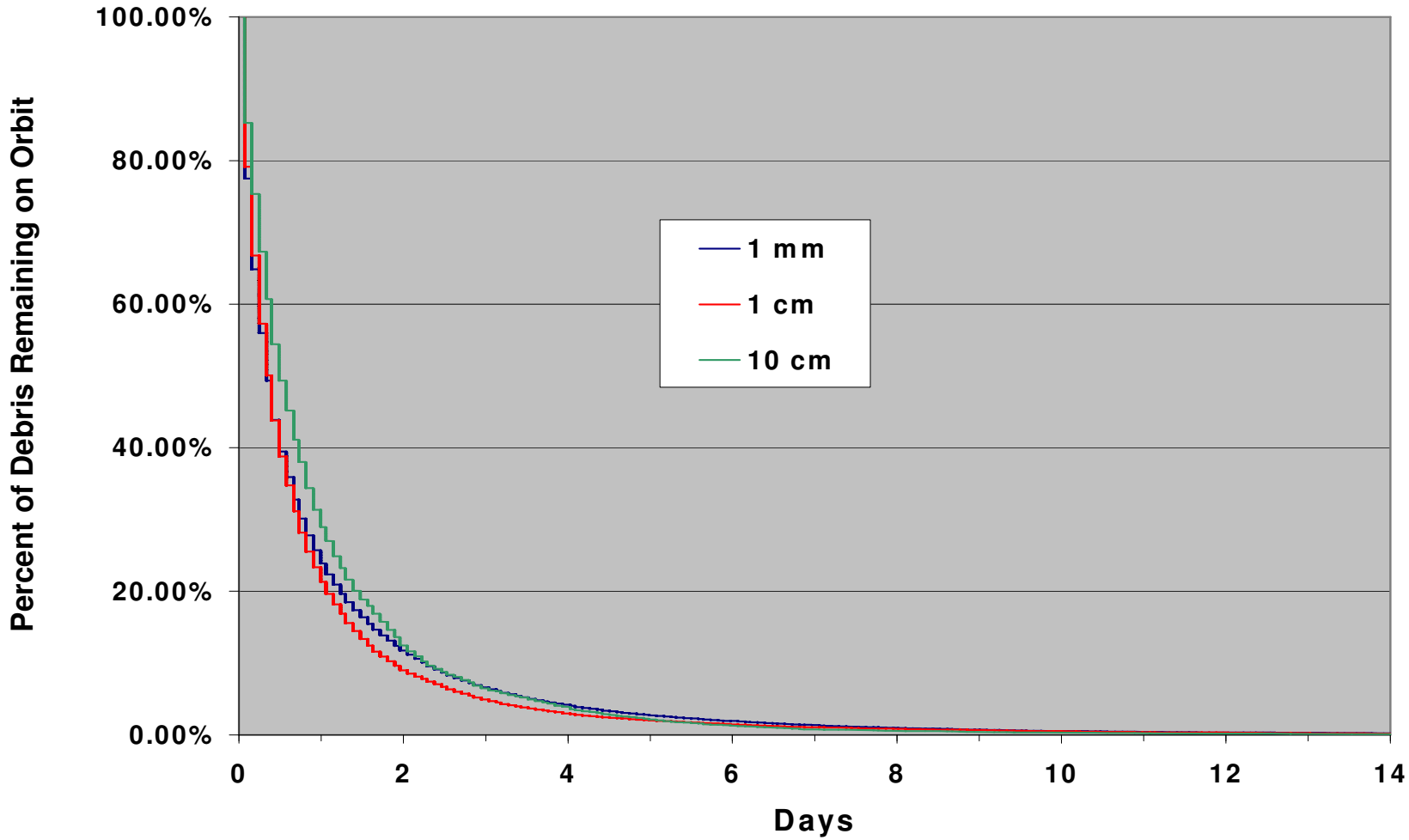
- **Paragraph 5.2.3 of the IADC Space Debris Mitigation Guidelines also addresses those rare cases when "intentional destruction and other harmful activities" might be necessary:**

  "Intentional destruction of a spacecraft or orbital stage, (self destruction, intentional collision, etc.), and other harmful activities that may significantly increase collision risks to other spacecraft and orbital stages should be avoided. For instance, intentional break-ups should be conducted at sufficiently low altitudes so that orbital fragments are short lived."

- **Under the plan to neutralize the USA-193 spacecraft, the event will not significantly increase collision risks to other spacecraft and orbital stages and will result in space debris with extremely short orbital lifetimes to be <u>fully compliant</u> with Paragraph 5.2.3 of the IADC Space Debris Mitigation Guidelines.**

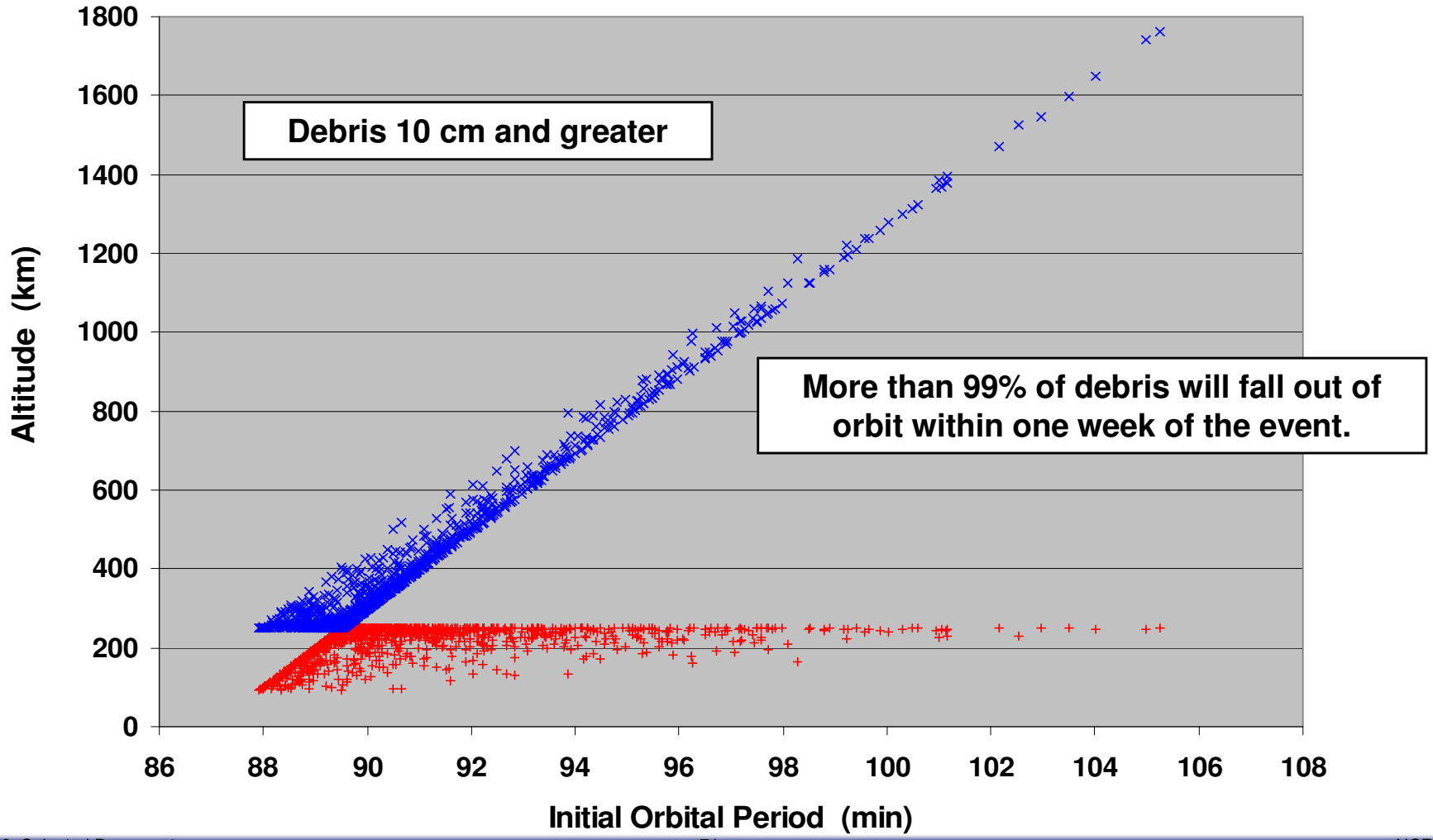
Maximum Longevity of Debris

- **Assuming a worst case scenario of fragmentation at 250 km, 99% of the debris placed in orbit will reenter within one week.**

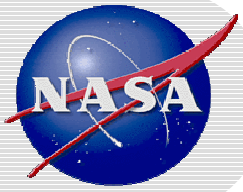


Initial Extent of Debris

- **Again assuming a worst case scenario of a fragmentation at 250 km, the majority of the orbital debris cloud would be confined to low altitudes.**



Risk to Space Operations



- **A principal consideration in planning for the engagement of USA-193 was the safety of on-going and future space operations, especially those associated with human space flight.**

- **The International Space Station operates in the second lowest orbit of all functioning spacecraft in Earth orbit at a mean altitude of approximately 335 km.**

- **The cumulative risk to ISS due to debris from USA-193 would be equivalent to about 2-3 days of exposure to the normal space debris environment. ISS, by far the largest operational spacecraft in Earth orbit, is now in its 10th year of operations and has not experienced any significant damage due to space debris.**

- **Any risks to robotic spacecraft due to debris from USA-193 is assessed to be considerably less than that calculated for ISS.**

FEMA

National Situation Update: Friday, February 15, 2008

Homeland Security Threat Level: YELLOW (ELEVATED).

Significant National Weather

Northeast:
A cold front moving through the Northeast today will bring light snow across northwest Pennsylvania, upstate New York and northern New England. The front will pass throngh the northeast corridor late in the day but will bring no significant precipitation. Temperatures will range from the low 30s in upstate New York to the low 50s in Virginia.

Midwest:
Another flow of arctic air is moving across the Midwest. The leading cold front will exit the region today while snow showers remain around the Great Lakes. Wind Chill Advisories are in effect this morning for portions of Minnesota, Wisconsin, and Iowa.
Temperatures today will be five to 25 degrees below average, ranging from the 30s in the Ohio Valley to below zero in Minnesota.

West:
A southwestern storm will bring heavy snow, up to a foot or more, to southern Colorado and the mountains of Arizona and New Mexico through the day. The lowest elevations near the Mexican border should expect rain showers. Santa Ana winds could gust as high as 70 mph in the monntains around Los Angeles today. Highs will range from the 20s across the intermountain West to the low 70s in the southern Colorado River Valley.

South:
Rain showers are forecast from Texas to western Tennessee and northwest Mississippi. Scattered thunderstorms across southeast Texas could produce hail late in the day. Strong thunderstorms along the Texas Gulf Coast could produce several tornadoes. Temperatures will range from the high 30s in Texas to the low 80s in Florida. (National Weather Service, Media Sources)

Mississippi Valley Severe Weather Update

Recovery efforts continue in Alabama, Arkansas, Kentucky, Mississippi, and Tennessee following severe weather that occurred on February 5, 2008.
State and Local
Alabama - six fatalities, six injured; 150 homes damaged or destroyed.
Arkansas - 13 fatalities (14 previously reported), 139 injured; 582 homes damaged or destroyed.
Kentucky - seven fatalities, numerous injuries; 345 homes damaged or destroyed.
Mississippi - zero fatalities, 355 homes damaged or destroyed.
Tennessee - 31 fatalities (32 previously reported), 192 injured; 830 homes damaged or destroyed. (State EOCs)

Midwest Flooding Update

Illinois:
Moderate flooding continues along the Illinois River from La Salle to La Grange; the river is expected to fall below flood stage on Sunday. There are approximately 888 customers without power. Illinois has eight shelters open with a population of 38, a decrease of 22 occupants from yesterday.

Indiana:
Moderate flooding continues along the Tippecanoe, Kankakee, White and Wabash rivers. All four rivers expected to crest north to south through Saturday, February 16, 2008. Along the Wabash River at Hutsonville Power Plant, flooding

is expected to be at critical levels for most levees. Water could surround residential areas of Riverton, Riverview, Hutsonville, and eastern York. Indiana still has one shelter open with one shelteree. (FEMA Region V)

Descending NRO Satellite

A U.S. satellite has malfunctioned and is expected to re-enter the Earth's atmosphere some time between the last week of February and the first week of March. The satellite is carrying Hydrazine and the potential release of this load is a concern. The chance of the satellite falling into a populated area is deemed to be small but, if it did, there would be a risk of death or injury to the population. The US Navy plans to use an interceptor missile to hit the satellite in an effort to ensure that it falls safely to earth. FEMA will manage the consequence management portion of this event, involving a significant amount of coordination and communication with national and international partners. DoD will perform post-impact clean-up and recovery.(FEMA HQ and DOD)

California Mudslides

Mudslides forced the shut down of an eight-mile stretch of State Route 78 on Thursday at 5:00 p.m. EST, following a day of rain. The California State Transportation Department reported about two feet of mud and rocks sliding onto the highway in an area burned by last fall's wildfires. Crews expect to have the roadway cleared and opened by the Friday morning commute. No injuries were reported. (NICC)

Tropical Weather Outlook

No new activity (FEMA HQ)

Earthquake Activity

No new activity (FEMA HQ)

Preliminary Damage Assessments

No new activity (FEMA HQ)

Disaster Declaration Activity

No new activity (FEMA HQ)

Foreign Ministry Spokesperson Liu Jianchao's Remarks on the US Plan to Destroy Malfunctioning Satellite

2008/02/18

Q: It is reported that the US would fire a missile to destroy a failed satellite that was due to fall on earth. What's China's position?

A: The Chinese Government is highly concerned over the developments and has requested the US to fulfill its international obligations in earnest and ensure that the security of outer space and relevant countries will not be undermined. Relevant Chinese authorities are closely following the situation and studying corresponding precautions.

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First Responder Guide
For
Space Object Re-Entry

February 18, 2008 Revised

FEMA

Table of Contents

Information for the Public

A United States satellite is falling back to earth and could potentially impact almost anywhere on the planet.

The satellite has hazardous materials on board that could pose immediate hazards to people if they come in contact with the material.

Specifically, the satellite contains fuel and metal containers that are considered hazardous materials and could survive entry intact.

Any debris should be considered potentially hazardous, and should not be touched, handled, or moved.

Citizens who observe or encounter falling debris should notify your local public safety agency and stay away from it.

Information for First Responders

The satellite that is degrading from orbit has hazardous materials on board that could pose immediate hazards to people if they come in contact with the material.

The craft contains fuel and specialized containers that are considered hazardous materials and could survive entry intact.

Any debris should be considered potentially hazardous, and first responders should not attempt to pick it up or move it.

First responders should secure a perimeter and control access around any debris. DO NOT pick up any debris. Notify your local emergency manager of its location immediately.

The concerns are similar to those encountered after the space shuttle Columbia entered the atmosphere. However, this craft has far less hazardous materials and is much smaller in size.

The following information about the two hazardous materials of concern is provided for first responders.

Hydrazine, anhydrous

US Department of Transportation
Emergency Response Guidebook (ERG) 2004
ERG Guide 132
ERG ID Number 2029

Potential Hazards

Fire or Explosion

- Flammable/combustible materials.
- May be ignited by heat, sparks or flames.
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and create flashback.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors, or in sewers.
- Those substances designated with a "P" may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

Health

- May cause toxic effects if inhaled or ingested/swallowed.
- Contact with substance may cause severe burns to skin and eyes.
- Fire will produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

Public Safety

- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.

- Ventilate closed spaces before entering.

Protective Clothing

- Wear positive pressure Self Contained Breathing Apparatus (SCBA).
- Wear chemical protective clothing that is specific for this product. It may provide little or no thermal protection.
- Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible.

Evacuation

- Large Spill
  - See the Table (see DOT ERG) of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase in the downwind direction, as necessary, the isolation distance shown under "PUBLIC SAFETY"
- Fire
  - If the tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (0.5 miles) in all directions. Also, consider initial evacuation for 800 meters (0.5 miles) in all directions.

Emergency Response

Fire

- Some of these materials may react violently with water.
- Small Fires
  - Dry chemical, carbon dioxide, water spray, or alcohol-resistant foam.
- Large Fires
  - Water spray, fog, or alcohol-resistant foam.
  - Move containers from the fire area if you can do so without risk.
  - Dike fire-control water for later disposal; do not scatter the material.
  - Do not get water inside containers.
- Fire Involving Tanks or Car/Trailer Loads
  - Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
  - Cool containers with flooding quantities of water until well after fire is out.

- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For a massive fire, use unmanned hose holders or monitor nozzles. If this is impossible, withdraw from the area and let the fire burn.

Spill or Leak

- Fully encapsulating, vapor-protective clothing should be worn for spills and leaks with no fire.
- ELIMINATE all ignition sources (no smoking, flares, sparks, or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop the leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements, or confined areas.
- A vapor-suppressing foam may be used to reduce vapors.
- Use clean non-sparking tools to collect absorbed material.

Large Spills

- Dike far ahead of the liquid spill for later disposal.
- Water spray may reduce vapor but may not prevent ignition in closed spaces.

First Aid

- Move victim to fresh air.
- Call 9-1-1 or emergency medical services.
- Give artificial respiration if the victim is not breathing.
- **Do not use mouth-to-mouth method if the victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.**
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Keep victim warm and quiet.

- Effects of exposure (inhalation, ingestion, or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the materials involved and take precautions to protect themselves.

Hydrazine (Expanded Information)

US Department Health and Human Services/National Institutes of Health (HHS/NIH)
US National Library of Medicine
Wireless Information System for Emergency Responders (WISER)
(http://webwiser.nlm.nih.gov/updateProfile.do)

Identification and Hazards

- **CAS:**
  302-01-2
  UN/NA:
  2029
  2030
  3293
  STCC:
  49 062 25
  49 350 30
- Handle as a CARCINOGEN—WITH EXTREME CAUTION
- HIGHLY CORROSIVE; can cause severe eye and skin irritation
- FLAMMABLE and REACTIVE; DANGEROUS FIRE and EXPLOSION HAZARD
- FIRE PRODUCES POISONOUS GASES
- CONTAINERS MAY EXPLODE IN FIRE
- Extinguish fire with dry chemical, carbon dioxide or water spray
- Beware of flashback from vapors

Limits

- OSHA Permissible Exposure Limit: Table Z-1 8-hr Time-Weighted Avg: 1 ppm (1.3 mg/cu m). Skin Designation. Vacated 1989 OSHA PEL TWA 0.1 ppm (0.1 mg/cu m), skin designation, is still enforced in some states.
- ACGIH 8 hr Time Weighted Avg (TWA): 0.01 ppm, skin ,A3; Confirmed animal carcinogen with unknown relevance to humans. Excursion Limit Recommendation: Excursions in worker exposure levels may exceed three times the TLV-TWA for no more than a total of 30 min during a work day, and under no circumstances should they exceed five times the TLV-TWA, provided that the TLV-TWA is not exceeded.
- Immediately Dangerous to Life or Health IDLH - 50 ppm; NIOSH considers hydrazine to be a potential occupational carcinogen.

DOT Hazard Classifications

Class 3 - Flammable liquids (and Combustible liquids [U.S.])
Class 6 - Toxic substances and Infectious substances
Class 8 - Corrosive substances
Division 6.1 - Toxic substances

Additional Information

NFPA704-Health	4	– Extreme
NFPA704-Flammability		4 – Extreme
NFPA704-Instability	3	– Severe/Serious
NFPA704-Special Hazards		Not Applicable

Fire Fighting Procedures

- Hydrazine vapor is exceptionally hazardous in that once it is ignited it will continue to burn by exothermic decomposition in complete absence of air or other oxidant.
- Flammable liquid - Flammable over a wide range including 100% pure material. Air or oxygen is not required for decomposition. Closed containers may rupture violently when heated. Thermally unstable. Ignites in air at room temperature on metal oxide surfaces, & in a wide variety of porous materials, such as cellulosic materials.
- Lower flammable limit: 2.9% by volume; Upper flammable limit: 98% by volume
- Explodes during distillation if traces of air are present, also affected by UV and metal ion catalysts.
- The decomposition reaction may be explosive, especially when catalysed by certain metals and metal oxides.

If the material is on fire or involved in a fire:

- Extinguish the fire using an agent suitable for the type of fire. (Material itself does not burn or burns with difficulty.)
- Keep runoff water out of sewers and water sources.
- Do not extinguish the fire unless flow can be stopped.
- Use water in flooding quantities as fog.
- Cool all affected containers with flooding quantities of water.
- Apply water from as far a distance as possible.
- Solid streams of water may be ineffective. Use “alcohol” foam, dry chemical, or carbon dioxide.
- Hydrazine can ignite spontaneously in air, when in contact with porous materials

Protective Equipment/Clothing

The following are recommendations for personal protective equipment (PPE) and decontamination, at any detectable concentration, when concentrations are above the

National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit (REL) or where there is no REL (Assigned protection factor = 10,000**):**

- Any self-contained breathing apparatus (SCBA) that has a full face piece and is operated in a pressure-demand or other positive-pressure mode should be considered (Assigned protection factor = 10,000).
- Any supplied-air respirator that has a full face piece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus should be considered.
- Any appropriate escape-type, SCBA should be considered.
- Wear appropriate personal protective clothing to prevent skin contact**.**
- Teams performing mitigation or assessment should use Level A suit.
- Wear appropriate eye protection to prevent eye contact.
- Eyewash fountains should be provided in areas where there is any possibility that workers could be exposed to the substance; this is irrespective of the recommendation involving the wearing of eye protection.
- Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure.
    - Note: It is intended that these facilities provide a sufficient quantity or flow of water to quickly remove the substance from any body areas likely to be exposed. The actual determination of what constitutes an adequate quick drench facility depends on the specific circumstances. In certain instances, a deluge shower should be readily available; whereas, in others, the availability of water from a sink or hose could be considered adequate.
- Vinyl-coated hand protection, natural or reclaimed rubber protection, rubber aprons, and plastic eye and face protection should be used when working with small quantities.
- Where the possibility of gross splashing exists, full protective clothing made of rubber, neoprene, or vinyl-coated materials should be worn.
- For respiratory protection in situations where recommended tolerance limits are exceeded, respiratory protective equipment should be used.

Symptoms of Exposure

- Neurological
    - Agitation
    - Lowered mental state
    - Unresponsive
    - Headache
    - Lack of coordination

- Spasms/Seizures

- Eyes
  - Dilated pupils
  - Light sensitivity
  - Eye irritation/redness
  - Eye swelling
  - Tearing
  - Impaired vision
  - Vision loss
- Nose
  - Nasal irritation
- Mouth/Throat
  - Mouth irritation
  - Drooling/Salivation
  - Throat irritation
- Cardiovascular
  - Arrhythmia
  - Hypoxia/cyanosis
- Respiratory
  - Irregular breathing
  - Shortness of breath
  - Respiratory burning/irritation
  - Pulmonary edema
  - Hypoxia/Cyanosis
- Gastro/Urinary
  - Nausea
  - Vomiting
  - Vomiting blood
  - Diarrhea
  - Urination, bloody
- Skin
  - Itching
  - Skin burns/burning

- Skin swelling
- Rash
- Skin redness
- Cyanosis/Blue

- NFPA704-Health
  - 4 - Extreme

Exposure Treatment

Oral Exposure

- Do NOT induce emesis (vomiting).
- **Dilution:** Immediately dilute with 4 to 8 ounces (120 to 240 mL) of water or milk (not to exceed 4 ounces/120 mL in a child).
- **Activated Charcoal:** Administer charcoal as a slurry (240 mL water/30 g charcoal). Usual dose: 25 to 100 g in adults/adolescents, 25 to 50 g in children (1 to 12 years), and 1 g/kg in infants less than 1 year old.
- **Gastric Lavage:** Consider after ingestion of a potentially life-threatening amount of poison if it can be performed soon after ingestion (generally within 1 hour). Protect the victim's airway by placing him or her in the Trendelenburg and left lateral decubitus position or by endotracheal intubation. Control any seizures first.
  - **Contraindications:** Loss of airway protective reflexes or decreased level of consciousness in unintubated patients; following ingestion of corrosives; hydrocarbons (high aspiration potential); patients at risk of hemorrhage or gastrointestinal perforation; and trivial or non-toxic ingestion.
- **Seizures:** Administer a benzodiazepine IV; Diazepam (Adult: 5 to 10 mg, repeat every 10 to 15 min as needed. Child: 0.2 to 0.5 mg/kg, repeat every 5 min as needed) or Lorazepam (Adult: 2 to 4 mg; Child: 0.05 to 0.1 mg/kg).
  - Consider phenobarbital if seizures recur after diazepam 30 mg (adults) or 10 mg (children > 5 years).
  - Monitor for hypotension, dysrhythmias, respiratory depression, and need for endotracheal intubation. Evaluate for hypoglycemia, electrolyte disturbances, and hypoxia.
- **Acute Lung Injury:** Maintain ventilation and oxygenation and evaluate with frequent arterial blood gas or pulse oximetry monitoring. Early use of PEEP and mechanical ventilation may be needed.
- **Methemoglobinemia:** Administer 1 to 2 mg/kg of 1% methylene blue slowly IV in symptomatic patients. Additional doses may be required.

- **Pyridoxine may be antidotal.** Dose of pyridoxine is 25 mg/kg, 1/3 given IM and 2/3 given IV over 3 hours. Increase the dose by 25 mg/kg every 5 to 10 minutes to a maximum of 300 mg/kg/dose for continuing symptoms.

Inhalation Exposure

- **Inhalation:** Move the patient to fresh air. Monitor for respiratory distress. If cough or difficulty breathing develops, evaluate for respiratory tract irritation, bronchitis, or pneumonitis. Administer oxygen and assist ventilation as required. Treat bronchospasm with inhaled beta2 agonist and oral or parenteral corticosteroids.
- **Seizures:** Administer a benzodiazepine IV; Diazepam (Adult: 5 to 10 mg, repeat every 10 to 15 min as needed. Child: 0.2 to 0.5 mg/kg, repeat every 5 min as needed) or Lorazepam (Adult: 2 to 4 mg; child: 0.05 to 0.1 mg/kg).
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Eye Exposure

- **Decontamination:** Irrigate exposed eyes with copious amounts of room temperature water for at least 15 minutes. If irritation, pain, swelling, lacrimation, or photophobia persist, the patient should be seen in a healthcare facility.
- Patients symptomatic following exposure should be observed in a controlled setting until all signs and symptoms have fully resolved.
- **Seizures:** Administer a benzodiazepine IV; Diazepam (Adult: 5 to 10 mg, repeat every 10 to 15 min as needed. child: 0.2 to 0.5 mg/kg, repeat every 5 min as needed) or Lorazepam (Adult: 2 to 4 mg; child: 0.05 to 0.1 mg/kg).
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Dermal Exposure

- Hydrazine can SPONTANEOUSLY IGNITE upon contact with cloth; clothing should be removed immediately.
- **Decontamination:** Remove contaminated clothing and wash exposed area thoroughly with soap and water. A physician may need to examine the area if irritation or pain persists.
- Treat dermal irritation or burns with standard topical therapy. Patients developing dermal hypersensitivity reactions may require treatment with systemic or topical corticosteroids or antihistamines.
- **Seizures:** Administer a benzodiazepine IV; Diazepam (Adult: 5 to 10 mg, repeat every 10 to 15 min as needed. Child: 0.2 to 0.5 mg/kg, repeat every 5 min as needed) or Lorazepam (Adult: 2 to 4 mg; child: 0.05 to 0.1 mg/kg).
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EPA Recommended Detection Instrumentation

- Honeywell (Zellweger) SPM - Hydrazine Low Level Key
  http://www.detect-measure.com/manuf_zell.html#SPM
  1-713-541-9800

- Drager detector tube - Hydrazine
  http://www.draeger.com/ST/internet/US/en/index.jsp
  1-800-858-1737

Reactivities and Incompatibilities

Additional Cautions for HazMat Teams

- Residue from dehydrating hydrazine with barium or calcium oxide slowly decomposes exothermically in daylight and finally explodes.
- Explosive metal hydrazides form when hydrazine & alkali metals are mixed in liquid ammonia.
- While boiling a sample of a polyester fiber in hydrazine in a glass beaker, the technician used a somewhat rusty pair of metal tweezers to handle the sample. When the tweezers were put in the solution, the solution ignited. The ignition temperature of hydrazine varies from 75 deg F in the presence of iron oxide to 518 deg F in a glass container.
- During the measurement of shock sensitivity of a mixture containing hydrazine, a drop of the hydrazine mixture fell inadvertently on the tetryl donor explosive. The tetryl immediately burst into flame.
- Oxidizers, hydrogen peroxide, nitric acid, metallic oxides, acids (Note: Can ignite SPONTANEOUSLY on contact with oxidizers or porous materials such as earth, wood, & cloth).
- Hydrazine ignites in contact with chlorine.
- Hydrazine is decomposed explosively by chromates & chromic anhydride.
- Hydrazine reacts vigorously with cupric oxide.
- Spontaneous ignition occurs when /fluorine & hydrazine/ are mixed.
- The catalytic decomposition of hydrazine in the presence of Raney nickel may be vigorous at room temp.
- The blue precipitate formed from nickel perchlorate & hydrazine in water exploded violently when a glass stirring rod was introduced into the suspension.
- Spontaneous ignition occurs when nitrous oxide & lithium hydride or hydrazine are mixed.
- Potassium dichromate or sodium dichromate reacts explosively with hydrazine.
- The action of an ethereal soln of hydrazine on zinc diamide or diethyl zinc, gives a product, zinc hydrazine, which explodes at 70 deg C.

Additional Resources

US National Library of Medicine - Hazardous Substances Data Bank (HSDB); http://toxnet.nlm.nih.gov/

US Environmental Protection Agency (EPA) - Technology Transfer Network Air Toxics Web Site; http://www.epa.gov/ttn/atw/hlthef/hydrazin.html

Department of Health and Human Services Centers for Disease Control and Prevention (CDC); http://emergency.cdc.gov/agent/hydrazine/

New Jersey Department of Health and Senior Services – Hazardous Substance Fact Sheet; http://nj.gov/health/eoh/rtkweb/documents/fs/1006.pdf

US Occupational Safety and Health Administration (OSHA) – Safety and Health Topics; http://www.osha.gov/dts/chemicalsampling/data/CH_245900.html

Hydrazine (Technical Information)

The National Institute for Occupational Safety and Health
http://www.cdc.gov/niosh/npg/npgname-a.html

NIOSH Publication No. 2005-149: *NIOSH Pocket Guide to Chemical Hazards*	**September 2005**
Hydrazine	**CAS** 302-01-2
H_2NNH_2	**RTECS** MU7175000
Synonyms & Trade Names Diamine, Hydrazine (anhydrous), Hydrazine base	**DOT ID & Guide** 2029 132 (anhydrous) 3293 152 (< or =37% solution) 2030 153 (37-64% solution) 2029 132 (>64% solution)

Exposure Limits	**NIOSH REL**: Ca C 0.03 ppm (0.04 mg/m^3) [2-hour] See Appendix A
	OSHA PEL†: TWA 1 ppm (1.3 mg/m^3) [skin]

IDLH Ca [50 ppm] See: 302012	**Conversion** 1 ppm = 1.31 mg/m^3

Physical Description

Colorless, fuming, oily liquid with an ammonia-like odor. [Note: A solid below 36°F.]

MW: 32.1	BP: 236°F	FRZ: 36°F	Sol: Miscible
VP: 10 mmHg	IP: 8.93 eV		Sp.Gr: 1.01
Fl.P: 99°F	UEL: 98%	LEL: 2.9%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities

Oxidizers, hydrogen peroxide, nitric acid, metallic oxides, acids [Note: Can ignite SPONTANEOUSLY on contact with oxidizers or porous materials such as earth, wood & cloth.]

Measurement Methods

NIOSH 3503; OSHA 20, 108
See: NMAM or OSHA Methods

Personal Protection & Sanitation

(See protection)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation
Provide: Eyewash, Quick drench

First Aid

(See procedures)
Eye: Irrigate immediately
Skin: Water flush immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus
Important additional information about respirator selection

Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms

Irritation eyes, skin, nose, throat; temporary blindness; dizziness, nausea; dermatitis; eye, skin burns; in animals: bronchitis, pulmonary edema; liver, kidney damage; convulsions; [potential occupational carcinogen]

Target Organs

Eyes, skin, respiratory system, central nervous system, liver, kidneys

Cancer Site

[in animals: tumors of the lungs, liver, blood vessels & intestine]

February 19, 2008

MEMORANDUM TO: America's First Responder Community

FROM: FEMA Disaster Operations Directorate

SUBJECT: Satellite Re-entry

A U.S. satellite has malfunctioned and is expected to re-enter the Earth's atmosphere sometime between the last week of February and the first week of March. Right now it is in an uncontrolled descent and as a result, the exact date, time and place of impact can not yet be determined. It is our plan to pass on more specific information with as much advance notice as possible. Please keep in mind that the probability that it will fall upon the United States is low, yet we must be ready.

The satellite weighs approximately 5,000 lbs and about 50 percent of it will probably survive re-entry. Of that amount, what is most concerning is the fuel tank. This tank contains approximately 1,000 lbs of Hydrazine as the fuel source and will likely survive re-entry and be intact when it strikes the earth. It may then rupture and release the hydrazine. There is no radiation on board.

As our nation's first responders, some of you may find yourself dealing with this issue within your community and response area. This will essentially be a Hazardous Material (HAZMAT) event that you will need to deal with, the same as if there was a chlorine or ammonia leak or spill you had to respond to. Hydrazine is a very dangerous chemical but no more so than many of the other substances that travel on the rails and highways of America everyday for which you train and prepare to respond.

The Department of Homeland Security, lead by the Federal Emergency Management Agency (FEMA), has developed an operations plan to support you in this response. It has been built collaboratively with the Department of Defense and other members of our federal interagency community. We have had the support of the Department of Transportation, the Environmental Protection Agency, the Department of Health and Human Services, the National Guard Bureau, Customs and Border Protection, and a host of other federal agencies.

We will have six Federal Joint Interagency Task Forces located around the country ready to deploy the moment we know the impact area, responding to assist you in your role of immediate consequence management. As you know, we follow the National Incident Management System (NIMS) / Incident Command System (ICS) as our incident management framework. Therefore, we want to make it clear that our response will be in support of the local incident commander as part of the local Unified Incident Command structure (more at www.fema.gov/nrf).

To help you prepare for a response to this highly unlikely situation, we have developed and attached a First Responder Guide. It contains information to help you prepare for a possible deployment should elements of this satellite come down in your area. More information will become available as this situation develops; however, we wanted to give you what details we can so you can begin to plan for the "what ifs" as they relate to your community. This is the time to work with your other local first response agencies to develop a plan of immediate action. We will be there to support you, in great numbers if necessary, but as with all emergency response situations, the first few hours will require your readiness until state and federal help arrives.

You will be receiving additional information through your state emergency management and homeland security agencies. Working with the FEMA Regions, they will help you prepare. On behalf of our nation, I thank you in advance for your service to your country.

Foreign Ministry Spokesperson Liu Jianchao's Regular Press Conference on February 19, 2008

2008/02/20

On the afternoon of February 19, Foreign Ministry Spokesperson Liu Jianchao held a regular press conference and answered questions on Kosovo's declaration of independence, Gambari's visit to China, Myanmar, Darfur, the Six-Party Talks and etc.

. . . Q: Is China concerned that the US trying to destroy the failed satellite is actually to cover up its anti-satellite test?

A: I would like to reiterate that China is highly concerned over the developments and has requested the US to fulfill its international obligations in earnest and ensure that the security of outer space and relevant countries will not be undermined. Relevant Chinese authorities are closely following the situation and studying corresponding precautions. The international community has concerns over the announcement of the US. I believe the US should fulfill its relevant responsibilities in real earnest.

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U.S. Department of Defense
Office of the Assistant Secretary of Defense (Public Affairs)
News Transcript

On the Web:
http://www.defenselink.mil/transcripts/transcript.aspx?transcriptid=4150
Media contact: +1 (703) 697-5131/697-5132

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http://www.defenselink.mil/faq/comment.html
or +1 (703) 428-0711 +1

Presenter: Pentagon Press Secretary Geoff Morrell **February 19, 2008 2:30 PM EST**

DoD News Briefing with Pentagon Press Secretary Geoff Morrell from the Pentagon

MR. MORRELL: Hey, good afternoon.

Q Afternoon.

MR. MORRELL: Thank you all for coming today. A brief opening statement. Then I'll be glad to take your questions.

Tomorrow morning Secretary Gates embarks on a nine-day trip around the world. Along the way he will be visiting Pacific Command in Hawaii, participating in the annual AUSMIN talks in Australia, and discussing security matters with his counterparts in Indonesia, India and Turkey.

You will note he departs on the same day the space shuttle is scheduled to land. As the vice chairman of the Joint Chiefs of Staff, General Cartwright, briefed you last week, touchdown of the Atlantis opens the window of opportunity for the military to shoot down that rapidly decaying U.S. intelligence satellite. General Cartwright and the commander of Strategic Command, General Chilton, supported by a slew of other experts across the military services and indeed the U.S. government, are evaluating the situation and will advise the secretary when they have a shot to take.

Secretary Gates has been empowered by President Bush to order the shootdown, and based upon the advice he gets, he is prepared to do so from the road, if necessary.

Within an hour of the missile being launched, we plan to issue a written statement notifying you, and within hours after that, General Cartwright will hold a news conference here at the Pentagon to brief you on our initial assessment of the operation.

However, you should know that it may take a day or more to determine if the hydrazine tank has been destroyed, thereby alleviating most of the danger posed by this falling satellite.

And with that, I'll be glad to take your questions. I was going to lead off with the birthday girl, Kristin Roberts, but she's nowhere to be found. So how about Reuters, nonetheless?

Q Actually, Geoff, I was wondering, could you tell us how confident Secretary Gates is in the ability of this latent system to shoot down the satellite, given that it is flying much faster than the kind of target that it usually acquires and that the target itself apparently doesn't provide the kind of heat generation that an ICBM would.

MR. MORRELL: I -- that question is inviting me down a slippery slope, I think. I want to take issue with a couple of things in the question, and yet I'm not an expert on this matter, so I hesitate to do so, including the notion that it's actually a harder target for this missile to strike. I do not believe it's traveling faster, but again, I don't think I should weigh into this -- wade into this.

I think what we ought to do is this. You have a briefing that went -- that was lengthy last week from General Cartwright in which a number of these questions were addressed to him. I think I should let that briefing stand. That said, I will tell you this: We plan on providing another briefing for you tomorrow on the process which we are about to undertake, including what kind of access, if any, we can provide to you all for covering this shoot-down if and when it takes place.

But I don't, David, want to get into a situation today from up here in which I go into the particulars and the technical aspects of this.

I will say this. I think the secretary shares the confidence his commanders have. And as it was expressed to you last week by General Cartwright, they have a high confidence that this engagement will indeed be successful. And I think Secretary Gates shares that confidence.

Luis?

Q Geoff, when was the Defense Department tasked with coming up with a potential scenario where they could shoot down this satellite? Was it early January? I mean, was this tasked to where there was feasibility done --

MR. MORRELL: This issue, Luis, was first -- this first became an issue in early January. I'm not going to -- I don't want to get into a situation where I'm talking about when it was officially tasked, but I can tell you this became an issue for the United States government in early January.

Q And at that point, did you gather the contractors and task them with putting together software changes that enabled this scenario?

MR. MORRELL: Yeah, I really think those are good questions -- were good questions for General Cartwright, and they may be good questions for the briefer we provide you tomorrow to get into the process and perhaps into some of the particulars like that, although I really -- I don't want to turn tomorrow's briefing into part two of what was provided last week. This is really to sort of look forward and to tell you about the process that we're about to engage in.

David?

Q There's this notice to mariners out there, puts this window Wednesday night, our time. Is that simply the first time after the shuttle lands that the satellite would come within range, or is that the time the Navy intends to take the first shot?

MR. MORRELL: I think, as we discussed last week with General Cartwright and the NASA administrator and Ambassador Jeffrey, the window of opportunity, as I just mentioned, opens as soon as the shuttle is safely on the ground. At that point, we begin to look at when is the best time to take a shot to bring down this dying satellite. You noted the NOTAM, the notice to airmen and mariners, that went out today. That is a standard notice that goes out in advance of an operation of this sort. It will -- it's a 24-hour notice, so it may take place within that 24 hours.

It may require an additional NOTAM to go out. We have a pretty wide aperture in which to take this shot, and I think that the commanders who are evaluating this are looking at all the conditions that could impact this, to make sure that when we do take this shot, it can be as successful as possible.

Q Are we going to know in advance that the decision has been made to take a shot?

MR. MORRELL: I think the way I've outlined it in this opening statement pretty much sums up how we are going to notify you. We will notify you as quickly as possible after a shot has been taken and we hope that to be within an hour of the launch via a written statement issued from our office here at the Pentagon. And then we hope that within hours after that General Cartwright can be here at this podium briefing you on our initial assessment of things. We can probably tell you at that point whether or not there has been an intercept. The issue, though, is we may not be able to tell you at that point if indeed we have destroyed the tank, and that may require some additional time.

Q How far in advance do you have to make a decision on this pass whether to shoot?

MR. MORRELL: I'm not going to get into, David, the precise timing of how we're going about this operation. I think those matters are best, at this point, kept at a close hold. I think all the people who are -- I can tell you this. I will tell you this. The secretary was briefed today on the plan, given the fact that he leaves tomorrow on this around-the-world trip, so that we all have an agreed-upon series of steps that need to be taken for this launch to be given the go-ahead.

Q Is it hours, minutes?

MR. MORRELL: I'm sorry?

Q Hours, minutes, can you --

MR. MORRELL: You mean hours or minutes -- say it one more time?

Q Does the decision have to be made hours ahead of the actual event, or does it just have to be made minutes ahead?

MR. MORRELL: I would say there is a window of opportunity that is hours in duration that can be utilized.

Q Is it --

Q How many opportunities in a day are you going to have to take the shots?

MR. MORRELL: Not shots, Dave.

Q How many opportunities in a day are you going to have to take the shot or how often is the satellite orbiting the Earth over --

MR. MORRELL: Those are good technical questions for those more skilled than I am in this area. I'm just -- I'm not -- if I start

getting into this, I'm going to find myself in a spot that I'm just not comfortable being in. I think -- hopefully when we get you together tomorrow with our process person, if there are additional issues that need to be addressed like this, he can take them up then.

Q Is it safe to say it won't happen before that briefing you're giving us tomorrow?

MR. MORRELL: (Chuckles.)

Go ahead, Pauline.

Q Aside from this mariners notice, is there any -- are there promises made to the international community about giving them notification before it happens?

MR. MORRELL: Well, I mean, as we talked about last night, there has -- there have been a series of notifications that have gone out to nations around the world, to international organizations, so that they are well aware at this point of what the situation is that we're confronting and how we plan to address it. So I think everybody is up to date on what our thinking is and what our course of action is going to be, and we will do our best to keep them apprised of how it develops over the coming days.

Q And have you issued an official estimate on how much the operation will cost?

MR. MORRELL: I'm not -- I know we -- I know that was among the issues that General Cartwright was looking at. I didn't come to the podium today with that off-hand. I think when I last heard it -- and this is a range, so we'll have to get you a more precise number -- I think it was from $30 (million) to $40 million was what the operation would cost.

Q Just one? Using one missile?

MR. MORRELL: Well, that's a good question. That's why I hate to get into a situation like this, Pauline. Let's try to take this up tomorrow as well. But I think the operation using, you know, three boats -- and I think it would be totality of the operation. I think it would be reconfiguring the three missiles and having the three ships -- I think the initial estimates were, they would cost in excess of $30 million.

Q Is your understanding that the three ships -- will one of the missiles fire from each of the ships? As I understand -- look, let's assume that the first one misses, the second one misses -- I mean, we are talking about three individual ships that will shoot each one, or would they all come from one?

MR. MORRELL: Again, I'm just going to --

Q (Off mike.)

MR. MORRELL: Yeah. Not for me.

Q (Off mike.)

MR. MORRELL: Not for me.

Peter?

Q And a different topic -- (off mike).

MR. MORRELL: Any more? Any more on these?

Okay.

Q I mean, with the Cuba question, when Fidel first fell sick, there was a lot talk and speculation about contingency planning, particularly for the issue of refugees and migration and this kind of thing. Do you have anything about what SOUTHCOM is up to or -- if anything, in terms of ships being moved, prepared, anything along those lines?

MR. MORRELL: I don't. I don't. I mean, I think that's -- you know, I think that's a question you could certainly pose to SOUTHCOM. If they are making any sort of preparations for any eventuality, it has not been shared with me. I think those questions -- I'll just head this off at the pass -- with regards to Cuba, I think, should be addressed to my colleague over at State. I think this is at this point not something that we here in this building are dealing with.

Q (Off mike.) (Laughter, cross talk.)

MR. MORRELL: (Off mike) – I can talk to you about the Adriatic conference, I was in that meeting.

Q (Off mike) -- pass off to State. The vote in Pakistan, the elections in Pakistan -- the secretary's watching -- reaction to or anything --

MR. MORRELL: No. No. If -- you know, if the secretary's had a reaction, we haven't spoken about it. I mean, I think that's,

again, another one that State is best able to handle. I know that Secretary Rice has had a statement which I think sums up where we are on this. And we have a relationship with the government, with the institutions of Pakistan. Above all else, individuals are -- while we have enjoyed good relationships with individuals, the -- our relationship with the people of Pakistan is mainly through the institutions of their government, rather than the individuals that serve in them now.

But I'd direct you for more to State. Yeah. Al Pessin.

Q (Off mike) -- the Adriatic readout.

MR. MORRELL: Yeah. (Laughter.)

Q Only Voice of America.

MR. MORRELL: Wow. (Laughter.) There goes David Martin heading for the wings on the Adriatic readout. (Chuckles.)

The Defense ministers from Albania, Macedonia and Croatia all came in today to meet with Secretary Gates. I think they spent about a half an hour together. This is all part of the fourth annual U.S.- Adriatic Charter Defense Ministerial, although it's the first one that we have hosted here in the U.S.

Today's meeting is really a precursor to a slew of meetings that will take place at a level lower than the secretary tomorrow. I think they culminate with a breakfast on Thursday.

But, you know, they discussed relations between the four nations. Obviously they discussed NATO enlargement. They discussed the situation in Iraq and Afghanistan. These are all countries that are certainly punching above their weight class when it comes to their contributions to those respective wars. And Kosovo did come up as well.

Q What was the substance of the Kosovo part?

MR. MORRELL: You know, I'm not going to get into the particulars of the discussion. I will give you sort of the broad parameters of what they discussed. You know, I think, you know, the main focus of the conversation was really updating the secretary on the measures that their respective militaries have taken to put themselves in position potentially to become members of the NATO alliance.

Q (Off mike.)

MR. MORRELL: Actually two of the ministers spoke English, and one used a translator.

(Cross talk, laughter.)

Q Did the topic of KFOR come up at all?

MR. MORRELL: KFOR, I mean, no, KFOR did not come up in the context of that discussion.

I mean, KFOR, as you know, is really not impacted by the declaration of independence by the Kosovars. It is, you know, U.N. Security Council Resolution 1244 is not impacted by the declaration of independence. Therefore the Kosovo Force: Their mission remains as it has been, to provide a safe and secure environment, and to do so in an impartial and fair way. So our forces there, which represent about 10 percent of the 16,000 that are on the ground, will remain there, at least for the foreseeable future.

(Cross talk.)

Q For the Secretary’s trip to India this week, how rigorously is he prepared to press the Indian government to buy potential Lockheed or Boeing airplanes as part of their large fighter program? Their competition?

MR. MORRELL: The secretary is always an advocate for U.S. defense companies.

He believes that these nations are going to arm themselves, going to fortify themselves, and it's best that they do so with us, if possible. And so I would expect that to be a topic of conversation, but I do not trust that it will be the focus of our efforts there. The focus will be on sort of our shared security interests in the region and around the world.

Q One follow-up. Are you prepared to offer any other technological support to India, the sale of command and control aircraft or radar missile defense systems? Anything in particular beyond the airplane issue?

MR. MORRELL: Yeah. You know, Tony, I'm not familiar at this point with what exactly the entire agenda will be with the Indians when we sit down with them. So I'm not in a position to chat with you about that right now.

Peter?

Q Can we go back to the satellite? The memo out to maritime and pilots -- the reported details on is that it's sort of 4:30 local as to when the 24-hour kicks in and it's sort of to the west of Hawaii. Are there any other details you can give us about that

memo that went out, at least compare notes?

MR. MORRELL: No. No, I know it went out, and I expect that if a shot is not taken within the 24 hours after that notice went out, there will likely be another NOTAM that goes out.

Q The one the went out, you don't have any details on?

Q But that NOTAM actually is a relatively specific time frame. I mean, it only goes until midnight Eastern Time, or like three or four hours --

MR. MORRELL: And if the shot is not taken within that window of opportunity, there likely will be another NOTAM which goes out with similar parameters.

Q But just to clarify on the time thing again, what you're saying is that at this moment, even though you have an idea of when you might take the first shot at it, no official decision has been made.

MR. MORRELL: That's correct. That -- I can assure you of that, unless something's changed in the last -- since I've come up to talk to you.

Q Who will make that decision?

MR. MORRELL: Who will make the decision on when to take the shot?

Q (Off mike.)

MR. MORRELL: Well, the secretary is authorized to make the decision to authorize taking the shot. He will be presented with the best assessment of General Chilton, the STRATCOM commander, and General Cartwright, who, as you know, is the former STRATCOM commander, now the vice chairman of the Joint Chiefs. And based upon the guidance he's given by those two generals, the secretary will make a decision on whether or not to go with it. And --

Q Ultimately it rests on Secretary Gates to decide when to go.

MR. MORRELL: The president has made a decision about how he wants to deal with the threat, the potential threat, posed by this dying satellite and the hydrazine it carries in its tank.

Now, with that decision made, the secretary's the one who will decide if and when to pull the trigger, pardon the term, on the missile launch.

Okay. Tony.

Q On the missile launch itself, a lot of critics of missile defense will seize on a failure to hit the satellite as missile defense is flawed, and this is like a manhood test for missile defense in general.

Does the Pentagon see this at all linked to the ground-based and sea-based missile defense program you've developed in the last decade? Is this a prove-out again of that concept?

MR. MORRELL: There have been many successful missile defense tests to date, which lead us to believe that the system works, and that we should be building upon it. So we are taking this step, as General Cartwright made abundantly clear last week, not to test our anti-satellite capabilities. We did that in 1985. Been there, done that.

This test, or this operation rather, is designed to alleviate a threat to human beings on this planet. There is a large tank of hydrazine fuel, onboard that satellite, that would pose a significant threat to people within the immediate vicinity of it if it were to hit land. And so not wishing to take that risk, the president has asked, ordered this department to shoot down that satellite. And that is what we are now evaluating, and that's what the secretary will decide to do based upon the advice of the commanders.

Q Geoff, can you say whether the secretary will be at some sort of command center in Hawaii? Or will he be going about his normal business and using his communications capability to make that assessment and decision?

MR. MORRELL: Yeah, I would get you off the notion that it's necessarily in Hawaii. We've got a long trip. It's nine days long. It could take place really any time along that trip. So we have the means for the secretary to stay in touch for this or any other eventuality that could come up during that time. It's the nature of the job that he has to be within secure communications and have the ability to communicate orders back to here. And it's no different on this trip or any other.

Q Geoff, the notice to mariners -- who actually issues that?

MR. MORRELL: I don't know who issued that. It may have been -- it sounds like it was the Navy and the Air Force -- airmen and mariners -- or it may have been the Navy. I'm not -- I have not seen the NOTAM. I know it went out. But as to who issued it, I'm not familiar with it.

Yes, Jonathan?

Q Pardon me if we've gone over this, but if we've already taken down a satellite, why not use the same techniques that we did in 1985?

MR. MORRELL: Listen, you're talking -- this -- I majored in English and -- I majored in government and English. I'm not familiar with how we take down satellites.

Q (Off mike.)

MR. MORRELL: (Laughs.) All right, I think we've now devolved to the point where I should adjourn. Is that all right? Is everybody covered?

Q Thank you.

MR. MORELL: Thanks, guys.

AMERICAN FORCES PRESS SERVICE
NEWS ARTICLES

Window to Open for Satellite Shoot-Down, Gates to Issue Order

By Donna Miles
American Forces Press Service

WASHINGTON, Feb. 19, 2008 – The anticipated landing tomorrow of the space shuttle Atlantis will open the window of opportunity for the U.S. military to shoot down a dying intelligence satellite headed toward Earth, Pentagon Press Secretary Geoff Morrell said today.

President Bush has authorized Defense Secretary Robert M. Gates to give the shoot-down order, and the secretary received a briefing on the plan today, Morrell said. The secretary is prepared to make that call from the road, if necessary, during his nine-day, around-the-world trip that begins tomorrow, he said.

Marine Gen. James E. Cartwright, vice chairman of the Joint Chiefs of Staff, told reporters last week the window of opportunity for shooting down the satellite would last seven or eight days.

“We have a pretty wide aperture with which to take this shot,” Morrell said today. “I think the commanders that are evaluating this are looking at all the conditions that could impact this to make sure that when we do take this shot, it can be as successful as possible.”

Cartwright, Air Force Gen. Kevin P. Chilton, commander of U.S. Strategic Command, and other experts across the military and U.S. government “are evaluating the situation and will advise the secretary when they have a shot to take,” Morrell said.

Pentagon officials began studying the situation in early January when it become clear that a malfunctioning U.S. spy satellite could cause death or injury if it fell in a populated area. Of particular concern is that the satellite could release hydrazine, a toxic chemical used as a maneuvering fuel.

A Pentagon plan was put together to strike the incoming satellite just above the atmosphere, rupturing the hydrazine tank in the process.

All systems appear to be “go” for the launch order. The Navy has prepared for the mission by modifying three SM-3 missiles aboard Aegis ships to strike the satellite, Cartwright said last week.

The international community has been informed of the mission and why it’s being conducted, Morrell said. “So I think everybody is up to date on what our thinking is and what our course of action is going to be, and we will keep them apprised of how it develops over the coming days,” he said.

The Federal Aviation Administration today issued a 24-hour notice warning aircraft and ships to steer clear of the projected shoot-down zone in the Pacific. New warnings will be issued every 24 hours during the anticipated shoot-down window, Morrell said.

The Pentagon will issue a written statement within an hour of the launch and will hold a news conference regarding the effort within the following hours, Morrell told reporters. “We can probably tell you at that point whether or not there has been an intercept,” but not necessarily if it destroyed the fuel tank, he said. “That may require some additional time,” he acknowledged.

Cartwright and other commanders associated with the mission “have a high confidence this engagement will indeed be successful, and I think Secretary Gates shares that confidence,” Morrell told reporters.

Morrell emphasized that the mission isn’t designed to test U.S. anti-satellite capabilities. “We did that in 1985. Been there, done that,” he said.

“This operation is designed to alleviate a threat to human beings on this planet. There is a large tank of hydrazine fuel onboard that satellite that would pose a significant threat to people within the immediate vicinity of it if it were to hit land,” Morrell said. “So not wishing to take that risk, the president has asked -- ordered -- this department to shoot down that satellite.

“And that is what we are now evaluating,” he continued, “and that is what the secretary will decide to do, based upon the advice of the commanders.”

Centers for Disease Control and Prevention
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Emergency Preparedness and Response

FEBRUARY 20, 2008

This is an official CDC Health Advisory

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Potential Health Effects Associated with Hydrazine and Satellite Reentry

The Centers for Disease Control and Prevention (CDC) is collaborating with federal partners to address potential health and safety threats associated with the reentry of an uncontrolled U.S. government satellite into the earth's atmosphere within the next few weeks. Because the satellite's fuel contains the toxic chemical **hydrazine**, it is possible that the reentry of the satellite could pose a public health threat if pieces of it fall into populated areas. The risk of health effects related to the satellite is considered to be low. However, CDC is encouraging health officials and clinicians to review information about the health effects related to hydrazine to prepare in case their communities are affected by satellite debris.

Hydrazine is a clear, colorless liquid with an ammonia-like odor. Hydrazine is highly reactive and easily catches fire. It can easily evaporate to the air and can dissolve in water. In soil, hydrazine may stick to particles. In each of these forms hydrazine breaks down quickly into less harmful compounds.

People can be exposed to hydrazine by breathing contaminated air, dermal contact, or ingestion. Breathing hydrazine may cause coughing and irritation of the throat and lungs, convulsions, tremors, or seizures. Dermal contact may cause redness, pain, and burns. Eating or drinking small amounts of hydrazine may cause nausea, vomiting, uncontrolled shaking, inflammation of the nerves, drowsiness, or coma.

Additional information about hydrazine can be found at http://emergency.cdc.gov/agent/hydrazine/ (http://emergency.cdc.gov/agent/hydrazine/), including the following topics:

Frequently asked questions about hydrazine (http://www.atsdr.cdc.gov/tfacts100.html (http://www.atsdr.cdc.gov/tfacts100.html))

Toxicologic & adverse health effect information about hydrazine (http://www.atsdr.cdc.gov/toxprofiles/tp100.html (http://www.atsdr.cdc.gov/toxprofiles/tp100.html))

NIOSH Pocket Safety guide to chemical hazards on hydrazine (http://www.cdc.gov/niosh/npg/npgd0329.html) (http://www.cdc.gov/niosh/npg/npgd0329.html)

Chemical Emergencies Overview (http://emergency.cdc.gov/chemical/overview.asp) (http://emergency.cdc.gov/chemical/overview.asp)

Emergency preparedness (http://emergency.cdc.gov/preparedness/) (http://emergency.cdc.gov/preparedness/)

Because we do not know yet where the satellite or satellite debris will land or the scope of any health risks associated with the satellite's reentry, CDC will be updating its website and providing the public health work force, clinicians, and the general public with more information as it becomes available.

You may also call CDC toll free at 1-800-CDC-INFO (1-800-232-4636) for more information.

Categories of Health Alert messages:

Health Alert conveys the highest level of importance; warrants immediate action or attention.

Health Advisory provides important information for a specific incident or situation; may not require immediate action.>

Health Update provides updated information regarding an incident or situation; unlikely to require immediate action.

This Message was distributed to State and Local Health Officers, Epidemiologists, State Laboratory Directors, PHEP Coordinators, HAN Coordinators and Public Information Officers as well as Public Health Associations and Clinician organizations

- Page last updated February 20, 2008

Centers for Disease Control and Prevention 1600 Clifton Rd. Atlanta, GA 30333, USA

Department of State: Daily Press Briefing

Sean McCormack, Spokesman
Washington, DC
February 20, 2008

QUESTION: Are you aware of any expressions of concern, other than from China, about the satellite shootdown?

MR. MCCORMACK: I'm not aware of anything we've gotten in over the transom from diplomatic channels. I've seen some comments in public, I think, from the Chinese and I think maybe the Russians, but –

QUESTION: Right.

MR. MCCORMACK: I'm not aware of anything that's come in via diplomatic channels.

QUESTION: You haven't heard anything from the Canadians?

MR. MCCORMACK: I haven't, no. No.

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U.S. Department of Defense
Office of the Assistant Secretary of Defense (Public Affairs)
News Transcript

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Presenter: Senior Military Official **February 20, 2008**

Defense Department Background Briefing on the Satellite Intercept Attempt

SR. MILITARY OFFICIAL: I think the easiest way for me to proceed is, I'll do two things for you and then we'll just go to your questions. But the first is to try to give you a sense of the information flow as we see how it'll unfold for you. And I'll give you my own best judgment of the quality of that information, because we're going to try to match time to events. So you know, I'm going to try to give you times when we will be available. The events may not always match up. So I'm -- just to give you a sense of that.

And then the second piece is to give you a little bit of the who, of who's doing what in this activity, so you got some sense of that, to help you build SA [situation awareness] and background on it.

On the first part of the kind of the sequence of information and how this is unfolding, one of the criteria that I laid out when we started in the last briefing was that we weren't going to do anything until we had the shuttle on the ground. So the shuttle's coming down here in the next few minutes, if it's not down now. It's down.

So we're now into the window, okay, the length of the window. There's some significant ambiguity at the back end of the window, based, as I said at the time, on how high the atmosphere is on any given day, because that then tells you when the satellite naturally would start to hit the atmosphere. So we want to catch it before it naturally hits the atmosphere, because when it hits the atmosphere, it tumbles and it's next to impossible to track.

So we're pretty comfortable right now that we'll have windows available to us through about the 29th or 30th. And then after that it will really start to become, let's say, more ambiguous, because we're trying to predict the weather out that far. So that's kind of the period, starting today and running basically out to about the 29th.

We'll make decisions each day as to whether we're going to proceed or not. Those decisions are a long list of criteria that during the day can change. Okay? So, you know, whether a range -- for instance, as you watch the shuttle, whether a range is fouled or unfouled, whether the ship is in exactly the right place, the right orientation, et cetera. But we'll walk through those criteria during the day, and so we expect to see the criteria change during the day several times before we get to the end.

What is different for us is that the window that we're talking about here is very precise. It's only a matter of seconds. Okay. So that window is short.

Q What do you mean, seconds? Do you mean --

SR. MILITARY OFFICIAL: Seconds that that window is open that an attempt can be made, okay? And there will be --

Q Each day --

SR. MILITARY OFFICIAL: Each day there will be one window. It will only exist for a matter of tens of seconds, and so you have to be at exactly the right place, exactly the right time, and all criteria have to line up exactly right. Okay, so this is a very, you know, precise -- unlike a tactical activity where any place at sea and we get a target and we're tracking it and as long as it's within range, we can -- this is more like a much more precise launch than you would normally tactically have. Okay? So we'll work our way through that all the way through the day.

Go back. Three ships. The first ship is Erie and it has two missiles. The reason it has two missiles is there's -- only

going to fire one, but it gives it two opportunities so that if the ship itself has a problem or the missile in the tube has a problem, we've got an alternative.

So again, that's another criteria during the day, is do I have a good missile, do I have a good ship alignment, et cetera. The box is very small, so probably if Erie goes red in the last few minutes, Decatur will be close and it will be shadowing, but there's going to be a period when it just can't get into the box quick enough. So we're only looking for one opportunity per day, one shot.

The third ship is there to give us more of a -- let's call it a stereo-type picture of what's going on from a standpoint of tracking. Okay? It does not have missiles. That's Russell. So what we're going to give to you -- let me hit one other piece. We're looking for a day window because it allows us to align all of our sensors. And we're looking from what we would call several different ends or phenomenologies, so visual, infrared, radar, anything that we can get to see this thing, but for the most part we're looking to be in the daylight to do this best -- okay? -- for all of those reasons.

So that means it's going to be nighttime on the East Coast. Okay? And the windows over that span of days will pretty much traverse the whole night, so I can't really tell you, you know, exactly what time, but what I will tell you is that when we attempt to take the shot -- and I'll leave it at not when we take the shot -- when we attempt to take the shot, we will tell you within an hour afterwards what happened on that shot. Attempted it, nothing happened. Attempted it, it flew away and missed. Attempted it, it flew away and we think it hit it, with reasonable confidence, high confidence.

That's probably as much as we're going to know. We'll have a sense that we hit based on the reporting. That information probably takes about an hour to get back and get some confirmation from at least a couple of different sensors so we don't have a single anomaly and try to trace that and then we have you off chasing that information. But we're going to try -- within an hour, we'll get a press release out that will say we've attempted and here's what that attempt netted us to the best of our knowledge.

And then the intent is, as early as you're willing to get up the next morning, I'll do an availability and give you as much as we have, which should get us at least a few hours' worth of information to correlate sensors, pull data in from around the globe, and then provide you with whatever I can provide you at that point. It may be interesting to you -- (chuckling) -- it may not, I mean, from the standpoint of the value of information. I just want to be frank with you. I may be here, you know, and we'll just share jokes.

But the reality is that even if we hit -- recall back to the -- I hate to use this as an example, but the ASAT, trying to count the debris, the size of the debris, where the debris is located as it orbits the Earth, all of that that has not come down while there is parts of it coming down is a difficult -- in other words, you have got a trace that goes by. You wait for it to go by again. That's confirmation that a piece of debris has circled the Earth. Gee, was that the first piece, or was that -- I mean, this is a -- you know, how many pieces are there, counting them, having them de-orbit at the same time you're counting. So there's going to be a lot of ambiguity -- where's the tank in all of this, and trying to make sure that we can somehow pinpoint that. Again, it's another reason why daylight, where we're shooting, is important, because if we can get optical sensors, if we can get other things on it, we get a higher degree of confidence that we understand the key piece of hardware that we're after, which is that tank, that hydrazine tank.

So it is a bit of a challenge, and I'm just trying to set the conditions here that the exquisiteness of the knowledge will probably not be great, early. I would expect that over a period of about 12 hours, if there's a large object that is still up in orbit, we'll know, and we'll have a good sense of whether that object is something that we're -- was important to us from the standpoint of the hydrazine tank, or whether it's a large piece of unidentified debris off of the shot.

We'll also be able to start telling you that we're seeing reentry starting to occur. When we come in the first thing in the morning, we hope that we will start to see it, because remember, about 90 minutes around on an orbit -- that will start to decay, but about 90 minutes around. So we'll get a couple of passes. The first three, to us, are the critical ones, well over 50 percent of the debris we expect to come down in those first three passes. That's why we're setting it up the way we are. So we'll start to have a sense of, how much? And then how quickly is it coming down into the atmosphere and into the earth?

Q What's 90 minutes?

SR. MILITARY OFFICIAL: Cycle around the earth for low Earth orbit is rough order of magnitude 90 minutes. So that's what we're looking at here as we try to pick it. So every 90 minutes, we're going to look at it based on any given sensor. And we'll work our way through that.

So I'll try to give you as much as I can, that next morning, about what we know. After that, we'll take a look at what we know in the morning, and get a sense of what we -- probably more interesting is, what don't we know, and then set an expectation

with you all about when we can go back at the, what don't we know? You know, what makes sense? And I'm happy to do that on a schedule-driven rather than an information-driven basis, if that makes more sense to you.

The other piece that I wanted to just take a minute on: I think the Navy has done some discussion, a little bit from the Air Force and the other services. But let me give you a sense of the who for the large pieces of this operation -- who's kind of doing what.

All of the activities in space, all of the sensors, all of the tracking, all of our knowledge is being coordinated out at the joint space operations center at Vandenberg. That's a joint operation but headed by 14th Air Force out at Vandenberg. Okay.

The terrestrial sensors -- which are large radars, telescopes, anything else that we can bring in -- for the most part is coordinated by the joint integrated missile defense team, which is run by the Army Space and Missile Defense Command. They are based out of, this office is based out of, Colorado Springs. And they manage all of the terrestrial sensors for us.

The command and control of all of this activity is run out of STRATCOM in Omaha, Nebraska. Happen to have a little familiarity with those guys. The launch side of this equation, the ships and the missile, are obviously Navy. And then because this is more like a test than an operation, we had to modify these missiles; we had to modify the system to do it. I'll put it into my own parlance of aircraft test.

When you have a production aircraft that you turn into a test asset, we used to call, we'd put orange wiring to them. But you put wires into them that are a distinctly different color, that instrument it, to give you much more information than a standard production asset would have. So it tells you and telemetries back everything that's happening for you.

So all of that work, on putting the instrumentation inside of the missile, was done by the Missile Defense Agency. Okay. They gave us, they brought us, all of the telemetry, the instrumentation, the things that will give us even more awareness of the performance and the activities going on.

And those are the key players here in the pieces of all of this event. I think those are the pieces I wanted to try to get to you, and give you a sense of. I'm happy now to kind of turn it over to you all, and we can do question-and-answer on this.

Sir?

Q How late in the day -- if today were the day, how late in the day would a decision be made to attempt the hit?

SR. MILITARY OFFICIAL: We'll work all the way through the day, each day, and we'll put the people on a 12-hour shift, so we'll make sure that they have three or four hours after the window and at least, you know, the rest of the 12 hours in front. So we'll probably start midday working on the issue, and we'll -- and counting -- like in NASA, counting down, making sure that all of the criteria are either being met, have a reasonable expectation of being met, or something is severely off -- weather or something like that -- that it's just no point in going further; we may stop at any given point.

Q Then you begin with the assumption that you can do it until something comes up that prevents you from doing it?

SR. MILITARY OFFICIAL: We do. Now, there are external activities going on. You know, there is a political world out there that we try to take into account. But most of this is much more associated with technical -- do I have the weather? Are the -- are all of the criteria from the standpoint of the orbit known, and can they be transmitted? Are all of the sensors up and feeding? Is command and control and comms up? It steps down through a long checklist, multiple times. Most of that checklist is automated, so it immediately tells you when something like Lake Erie's comm went down or something like that happens. We'll get a notification right away.

Q Who makes the call, that you'd have to call up -- that you wouldn't do it today or you would do it today, who makes that --

SR. MILITARY OFFICIAL: To start, we basically are assuming each day is a valid opportunity, okay? But what we're looking for during the day, we could start very early with -- there's a typhoon, that it could -- not today. Okay? But more likely you're going to start working your way through until something convinces you that today shouldn't be the day.

And even if today is the day technically, there may be an operational reason or a political reason, a geopolitical -- whatever it is, that says: Gee, I think we better step back from this one today. How many opportunities do I have in front of me is always a consideration. As to whether or not you want to take any risk in this, risk could be: Gee, maybe the weather is kind of on the margin, and I'm still willing to, because I've only got one day left, or something like that.

But at the front end, we're going to take almost no risk. I mean, we're going to -- everything has to be green.

Q To follow up to that, then will you, if you do have one of these occurrences where you have a typhoon and it's very apparent you're not going to go ahead, then will you let us know that, so we don't staff into the wee hours of the night?

SR. MILITARY OFFICIAL: We should be able to. There's no typhoons out there right now.

Q Yeah.

SR. MILITARY OFFICIAL: But today is a weather day.

Q But if you do call it off --

Q What do you mean, today is --

(Cross talk.)

SR. MILITARY OFFICIAL: That today is a weather day, you know.

Q That means that bad weather is --

SR. MILITARY OFFICIAL: That means that the weather is just not going to -- we don't anticipate the weather being good enough today. Now, that's where it sits right now. It's on the margin, you know. And so we'll come back to you.

But we'll try to do this, but I don't want to mislead you. These things will change during the day multiple times. I don't expect to see typhoons out there, but -- based on the forecast that we have, but sea heights and winds and all of those things will play, and they change during the day. So we'll continue to watch. It has not been enough for us to say no, no reason to, yet. But we're watching weather today.

Sir.

Q This is a very practical question for us back here. You say this is going to be a daylight operation.

SR. MILITARY OFFICIAL: Out there.

Q Right. What time here does daylight end there?

SR. MILITARY OFFICIAL: I think they're generally -- you're asking a Marine to do math in public here. (Laughs, laughter). But I think that they're generally about seven hours behind us, six, seven hours behind us.

Q But you've been asking reporters to do rocket science, so -- (laughter.)

SR. MILITARY OFFICIAL: (Laughs.) Fair trade. But I think that's about the trade that you have out there in the Pacific.

Sir.

Q Well -- excuse me. So what would be the approximate time here?

SR. MILITARY OFFICIAL: Well, again -- (interrupted by laughter).

Q It's a window.

SR. MILITARY OFFICIAL: So if it gets dark here at six-ish --

Q How late do we have to stay here tonight? (Laughter.)

SR. MILITARY OFFICIAL: It's going to change every day. And it's a good spread -- I mean, because we're looking for the best. The window is small, as I said, but we're looking for the best orientation of the satellite so that the following three revolutions go over the water as much as possible or over unpopulated areas as much as possible, that we have the right lighting conditions for all of the sensors that are optical, so that we have the best chance of knowing what we did or didn't do. So all of

those things will go into the play. And so it does move quite a bit each day. And so me telling you, even today, what it is -- we're still working that out, making sure that we've got that nailed down. It goes through the day as we determine that.

I'm sorry -- a question?

Q About -- just as a practical question, who is going to put out the news within the hour of the test, DOD? (Off mike.)

SR. MILITARY OFFICIAL: Yes.

Q And you had said that there's -- the window is only once a day for tens of seconds. Can you elaborate? Considering it orbits the earth every ninety minutes, why only one shot a day?

SR. MILITARY OFFICIAL: Because we want it to be in the precise place so that the next three orbits will be over the water as much as possible.

Sir?

Q Is it currently going 90 minutes?

SR. MILITARY OFFICIAL: You know, if you were the rocket scientist, I mean, I -- we'd be talking seconds, but rough order of magnitude to stay in orbit at low Earth orbit, at the bottom, is about a 90-minute cycle, with perigee and -- sorry -- with the high point of that orbit and the low point of that orbit, you know, being reasonably symmetrical.

Okay.

Q Is there any reason that we can't know the window today? Is that --

SR. MILITARY OFFICIAL: I'm not sure that we -- I mean, we've got a sense of it right now, but we'll -- it moves -- I'm not trying to hide something from you; it moves enough that we would be chasing ourselves.

Q But one of our space geeks/experts at NBC said that it only moves like 15 minutes per day. Is that not your -- you think it's more that?

SR. MILITARY OFFICIAL: If -- here's a way to look at it. If what were moving is -- if you had a globe, and we're trucking across the globe doing this, okay, what we're trying to do is get nailed down right here. But what we need for accuracy is down to seconds, okay? Yes, the variance each day as it moves across is 15, 20 minutes, but do we want to catch it in this window, do we want to catch it in this window -- we have more than one window we can look at in a given day.

Okay. Once we pick the window, which is part of the work that we do in the countdown, where do we have stability? There's a set of data that's called ephemeris data. But it is the precise data that is gathered from all of the sensors as it rotates the Earth. We're trying to use that data to pick those windows during the day. If you miss a sensor and you -- you know, you want to go back and collect -- so we're looking for the best data that we can get, lead it with the putting the ship in the right place, so that we get the best angles and then we get the best following three rotations. So yes, in a day, this point will probably only move 10 or 15 minutes until tomorrow, but we have more than one point that we can choose from.

Okay. Pat, then -- I'm sorry. Go ahead.

Q Apart from the MDA instrumentation, could you help us understand what kinds of modifications had to be made to the ships and the --

STAFF: Before we get to that, let's see if there's any more questions about how information will flow, about that --

SR. MILITARY OFFICIAL: I'll come back.

STAFF: -- and we'll come back for an operational issue if we have time.

Q If you can elaborate on what you said earlier about today's weather, what is wrong with today's weather?

SR. MILITARY OFFICIAL: Waves.

Q Waves.

SR. MILITARY OFFICIAL: Sea. Sea state.

Q (Off mike) -- especially for the ship, as opposed to anything else?

SR. MILITARY OFFICIAL: Mostly, yeah. Yeah. Sea state.

I'm sorry, there was one over here?

Q Who is the person who makes the call, today's go? And how long before the actual shot, before that seconds-long window, do you have to make that decision?

SR. MILITARY OFFICIAL: Command and control, as we refer to it, is always a challenge here. In the chain there are a series of no votes -- my words -- but people who can say stop because my criteria, weather, is not being met. There are very few yes votes, and the question is, where do you have that yes vote? The commander of U.S. Strategic Command will give the secretary of Defense a recommendation, and then the secretary of Defense will look at that recommendation, make a judgment based on it. He will have more than one opportunity during the day to do that because we keep re-looking at it through the day. So there are multiple opportunities. We'll have a point of no return, so to speak, that's down in the minutes area, and it will be based on whatever it is that has kept us potentially holding, if it were weather or something like that. But --

Q Minutes as in 60 minutes, or minutes as in five minutes?

SR. MILITARY OFFICIAL: It could go down. It just depends. It depends on what criteria it is that's holding us back, how serious that criteria is and what the expectation of maybe being able to clear that criteria is. If we're swapping missiles, if we're just worried about wave height -- not just, but each one of them will be different. But we'll have the opportunity. But we'll get down to a point of no return, where we turn it over to the ship to execute.

Q So on press, to be clear, you will not be putting out a notification that we've launched the missile and then an hour later a press release, or will it be just a press release an hour after the event?

SR. MILITARY OFFICIAL: That's correct.

Q So we could all be sitting here and you could have launched and we wouldn't know, necessarily, until the press release comes out.

SR. MILITARY OFFICIAL: That's correct.

Q Is there any way for us who are in the building to pick -- you know, pepper you guys on background, "Did it launch or did it not launch?" type of thing?

SR. MILITARY OFFICIAL: (Laughs.)

Q Well, it's a practical question.

Q There's a danger -- you know, we know that you'll try and keep this as clean as possible, but if it starts to filter out that there has been a shot and we're still having to wait an hour before we can even confirm there's been a shot, is there no way that you can just tell us first that you've taken a shot and that's all you can tell us, but at least that fact is out there?

SR. MILITARY OFFICIAL: Let me go back and work it. Okay.

Q The Navy said yesterday that on some of their missile tests there's a video camera in the warhead. Will there be one on this?

SR. MILITARY OFFICIAL: That's in the instrumentation of the SM-3 when we try to do test shots. Let me go find out, but generally there are two cameras. There's one on the booster -- for a test -- there's one on the booster, and you've seen these. NASA uses the same system, one that's looking down behind, so to speak, so you can see it departing, and one that's looking up. We wouldn't normally put that on a shot like this, but let me go see what they've done with this one.

Q Can you explain exactly on what basis Secretary Gates would make a decision? I mean, that is to say, sort of why he's involved in the process? Once all your technical experts, you know, make a determination, what's left for him to decide?

SR. MILITARY OFFICIAL: He takes the advice of the commander at Strategic Command, who has pulled all of -- it's STRATCOM's job to pull all of the pieces together from all these agencies and all of the people who have an equity in the technical side of this thing as well as any other considerations that we're making. He makes that recommendation to the secretary.

The secretary has retained it, because normally in a tactical scenario to launch, say, an SM-3 in an operational scenario, that would be delegated down to the ship's captain. Here, because this is so unique, because we've done modifications, because it has got substantial attention and because there are issues here with making sure that, okay, are there any parameters that we're close on/not close on, we're going to bring that decision back. And because we have -- even though the shot window is small, the number of days are reasonably large, there's enough time to make a judgment at that level and so we're going to do it for this particular issue. So it is unusual to take a tactical system and bring it all the way back to the secretary of Defense for a cleared/not cleared type of scenario.

Q So he's basically going to decide whether whatever amount of risk -- because you said you're going to take very little today but maybe a little more later on. So the secretary will look at the amount of risk that General Chilton brings to him and decide whether he's comfortable with it?

SR. MILITARY OFFICIAL: That's correct. That's correct.

STAFF: We've got two minutes, so if there's any more process questions --

Q Regarding air traffic, how are you going to proceed and notify? Do you have anybody to notify or --

SR. MILITARY OFFICIAL: Yeah. It goes out. Two notifications go out worldwide, notification to mariners and notification to aviators. And the aviation risk right now as we have calculated -- and we've got pretty good experience on this -- is sufficiently low that FAA/the international agency, ICAO, have elected already that they're probably not going to reroute air because they don't expect that to be a threat. And then the notice to mariners also goes out, which I think was reported yesterday. We opened that window -- or that box up yesterday.

Q Will your briefing the next morning be on background or on the record?

SR. MILITARY OFFICIAL: (Inaudible) -- record.

Q If you make a decision today during the course of today to not do it today, will you tell us that when you make that decision?

SR. MILITARY OFFICIAL: Let me go check and see what their thought process is. If we know early that it's hard no-go, then we'll try to not keep you up all night.

Q Thank you.

Q Will you release video?

SR. MILITARY OFFICIAL: We're looking at that to try to see, but we're trying to get imagery for you.

Q Are the NOTAMs issued yesterday valid, for west of Hawaii?

Q Notice to Airmen.

SR. MILITARY OFFICIAL: Yeah, no, I know what a NOTAM is – if they released a NOTAM it's valid.

Q They were posted by the DOD, but the FAA says they were only meant to be drafts and they are not valid.

SR. MILITARY OFFICIAL: Oh, okay, I hadn't heard that. But generally we try to get them out at least 24 hours prior. It's the ships that have the hardest time because once they start on a path or they're in a box it takes them a while to clear.

Q (Off mike.)

SR. MILITARY OFFICIAL: They'll have a sunset clause associated with them that gives you the window, and if we cancel early, we remove them.

STAFF: Okay, we are out of time. I want to thank you for coming today, and I hope that this has been helpful. And thanks to our senior Defense official, if you need to attribute, or senior military official, excuse me.

AMERICAN FORCES PRESS SERVICE
NEWS ARTICLES

Pentagon Opens Window of Time to Shoot Down Satellite

By Gerry J. Gilmore
American Forces Press Service

WASHINGTON, Feb. 20, 2008 – The Pentagon has opened the window of time in which it will shoot down a malfunctioning U.S. reconnaissance satellite, a senior U.S. military officer said here today.

Today's return of the space shuttle Atlantis to Earth prompted the start of the optimal time period for shooting down the satellite, which extends until about the end of the month, the senior officer told Pentagon reporters.

Only "tens of seconds" will be available each day for a favorable launch of a ship-based SM-3 interceptor missile, the senior officer said. "The window is small, … but we're looking for the best orientation of the satellite" before launching the missile, the officer explained.

The 5,000-pound satellite malfunctioned soon after it was launched in 2006, making it unresponsive to ground control. It is carrying a tank full of hydrazine, a toxic rocket fuel. The satellite, orbiting every 90 minutes or so, was expected to fall to Earth in February or March with its tank of hydrazine intact, possibly endangering human populations.

President Bush directed the Defense Department to engage the satellite just before it enters the atmosphere at about 150 miles above the Earth. The goal is for the missile to hit and rupture the tank of rocket fuel, causing the hydrazine to burn up harmlessly in the atmosphere, along with debris from the stricken satellite.

About 50 percent of debris produced by the missile strike is expected to burn up during the stricken satellite's first two orbits after being hit, the senior military officer said, with the rest burning up shortly after.

Defense Secretary Robert M. Gates is to give the order to launch, based upon commanders' recommendations, the senior officer said. Gates will be advised as to the optimal time to launch by the commander of U.S. Strategic Command, based at Offutt Air Force Base, in Omaha, Neb.

All space sensor and missile-tracking activity related to the missile launch is being coordinated by the Joint Space Operations Center, at Vandenberg Air Force Base, Calif. Sensors, such as large radars and telescopes, are being coordinated by the Joint Integrated Missile Defense Team in Colorado Springs, Colo., under the U.S. Army's Space and Missile Defense Command.

Three U.S. Navy ships -- the cruiser USS Lake Erie and the destroyers USS Decatur and USS

Russell -- are posted in the Pacific Ocean waiting for an optimal time to launch, the senior officer said. The Erie is slated to shoot at the satellite, and it is fitted with two SM-3 missiles. The Decatur has one, and the Russell has none. The missiles were modified to carry additional sensor equipment for the mission, the senior officer said.

The launch will be conducted during daytime over the Pacific, the senior officer explained, so that all sensors involved can better track the results of the missile launch. Necessary criteria for launch include satisfactory alignment of all pre-launch sensor-supplied data, as well as favorable weather conditions, he said.

Currently, the wave height about the ships is unfavorable to launch, the officer said. However, this and other conditions are subject to change, he added.

AMERICAN FORCES PRESS SERVICE
NEWS ARTICLES

Navy Missile Hits Decaying Satellite Over Pacific Ocean

American Forces Press Service

WASHINGTON, Feb. 20, 2008 – A network of land-, air-, sea- and spaced-based sensors confirms that the U.S. military intercepted a non-functioning National Reconnaissance Office satellite which was in its final orbits before entering the earth's atmosphere, defense officials announced in a press release. (Video)

At approximately 10:26 p.m. EST today, a U.S. Navy AEGIS warship, the USS Lake Erie (CG-70), fired a single modified tactical Standard Missile-3 (SM-3) hitting the satellite approximately 153 miles (133 nautical miles) over the Pacific Ocean as it traveled in space at more than 17,000 mph. USS Decatur (DDG-73) and USS Russell (DDG-59) were also part of the task force.

The objective was to rupture the fuel tank to dissipate the approximately 1,000 pounds (453 kg) of hydrazine, a hazardous fuel which could pose a danger to people on earth, before it entered into earth's atmosphere. Confirmation that the fuel tank has been fragmented should be available within 24 hours.

Due to the relatively low altitude of the satellite at the time of the engagement, debris will begin to re-enter the earth’s atmosphere immediately. Nearly all of the debris will burn up on reentry within 24-48 hours and the remaining debris should re-enter within 40 days.

DoD will conduct a press briefing at 7 a.m. EST to provide further information related to the operation. The briefing can be viewed live on www.Defenselink.com through the Pentagon Channel.

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FEMA

National Situation Update: Thursday, February 21, 2008

Homeland Security Threat Level: YELLOW (ELEVATED).

National Weather Forecast

Midwest
Light snow is expected from Kansas through Iowa and Missouri into the Ohio Valley. South of this snow line, a mix of snow, sleet and freezing rain will make travel treacherous from Kansas to the Ohio Valley.
Temperatures, meanwhile, will continue to run well below late winter averages over most of the region with highs ranging from near zero in northeast North Dakota to the 30s across the Plains Kentucky.

South
Except for southwest Texas and North Carolina, most of the southern U.S. will be rather wet tomorrow as a storm center moves over southern Texas. Rain is likely in Louisiana and Mississippi. Also, a few severe thunderstorms (with isolated tornadoes) may occur in Texas and Louisiana. In addition to rain and thunder, the storm will have a wintry aspect, too. At least modest amounts of sleet and freezing rain are expected to cause problems in parts of Oklahoma and Arkansas. High temperatures are forecast to range from the 30s in Oklahoma and Arkansas to the 80s in south Texas and along the west coast of the Florida Peninsula.

West
A front moving toward the West Coast from the Pacific tomorrow will produce showers from Washington State to California's Point Conception. The heaviest rainfall, perhaps near an inch, is expected in the coastal mountains of northwest California. In the Southwest, an upper-air disturbance will scatter rain and mountain snow showers Utah, Arizona, Colorado and New Mexico. Several inches of snow will frost the mountains of Colorado and New Mexico. High temperatures are predicted to range from the 20s in the Rockies to the 70s in the lower Colorado River Valley. (NWS, Media Sources)

Space Object Re-Entry Recovery

Approximately 10:26 p.m. EST February 20, 2008, the U.S. Navy fired a missile striking the satellite. The objective was to rupture the fuel tank to dissipate the approximately 1,000 pounds (453 kg) of hydrazine. Confirmation that the fuel tank has been fragmented should be available within 24 hours. Due to the relatively low altitude of the satellite at the time of the engagement, debris began to re-enter the earth's atmosphere immediately. Nearly all of the debris will burn up on reentry within 24-48 hours and the remaining debris should re-enter within 40 days. The NRCC Manager authorized partial release of NRCC Activation team; the NRCC is still activated at Level III and will continue to monitor and report on any developments. (Office of the Assistant Secretary of Defense Public Affairs, FEMA HQ)

Leadville, CO

The EPA has agreed to a plan to widen an existing shaft behind the blockage and pump water directly from the tunnel, a process that could begin in four-to-eight-weeks. The water to be drained is believed, by the EPA, to be clean water and will be pumped from the Gaw shaft directly into Arkansas River. Officials will test the emergency notification system at 5:30 p.m. MST, February 22, 2008. Officials recommended diverting clean water from two other sources, so that they don't flow into the tunnel. (US Bureau of Reclamation, Open Sources)

Fire Management Assistance Grant (FMAG)

No significant activity to report. (FEMA HQ)

Tropical Weather Outlook

No new activity (FEMA HQ)

Earthquake Activity

No new activity (FEMA HQ)

Preliminary Damage Assessments

No new activity (FEMA HQ)

Disaster Declaration Activity

Amendment four was issued for AR-1744-DR adding: Marion County IA and PA; Union County IA; and Newton County PA.
Amendment five was issued for AR-1744-DR closing the incident period effective February 12, 2008.
Amendment two was issued for TN-1745-DR adding: Fayette County IA and PA; Hardin, Macon, Madison, Shelby and Sumner Counties PA categories C-G; Benton, Hickman, Houston, Lewis, Perry, Trousdale and Williamson Counties PA; Haywood and McNairy Counties PA. (FEMA HQ)

NOTAM Request for:
FDC 8/5536

!FDC 8/5536 FDC SPECIAL NOTICE .. THIS NOTAM REPLACES FDC 8/5501 DUE TO ADDITION OF CONTACT NUMBER. EFFECTIVE IMMEDIATELY UNTIL 0803092300 UTC. AIRCRAFT ARE ADVISED THAT A POTENTIAL HAZARD MAY OCCUR DUE TO REENTRY OF SATELLITE USA-193 DEBRIS INTO THE EARTHS ATMOSPHERE. FURTHER NOTAMS WILL BE ISSUED IF MORE INFORMATION BECOMES AVAILABLE. IN THE INTEREST OF FLIGHT SAFETY, IT IS CRITICAL THAT ALL PILOTS/FLIGHT CREW MEMBERS REPORT ANY OBSERVED FALLING SPACE DEBRIS TO THE APPROPRIATE ATC FACILITY TO INCLUDE POSITION, ALTITUDE, TIME, AND DIRECTION OF DEBRIS OBSERVED. FAA HEADQUARTERS, AIR TRAFFIC SYSTEMS OPERATIONS SECURITY, 202-493-5107, IS THE FAA COORDINATION FACILITY.

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Department of State: Daily Press Briefing

Sean McCormack, Spokesman
Washington, DC
February 21, 2008

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QUESTION: Different topic?

MR. MCCORMACK: Sure.

QUESTION: International reaction with the satellite shootdown; have you received any, have you offered any?

MR. MCCORMACK: I'm not aware of any reaction we've received through diplomatic channels. I know that some states have made some comments in public. I know that the Chinese have. I checked to see what we did in the wake of the DOD announcement earlier this morning or last night and essentially, what we did is took the information that DOD had publicly put out and provided that to our embassies via our cable system. We sent out a cable. And I suspect as more information evolves in terms of confirming exactly what the results of the tests were, we're going to provide that. And if anybody has any questions, we'll answer those on a case-by-case basis.

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AMERICAN FORCES PRESS SERVICE
NEWS ARTICLES

Navy Missile Likely Hit Fuel Tank on Disabled Satellite

By Gerry J. Gilmore
American Forces Press Service

WASHINGTON, Feb. 21, 2008 – The missile fired from a U.S. Navy ship in the Pacific Ocean that hit a malfunctioning U.S. reconnaissance satellite late yesterday likely accomplished its goal of destroying the satellite's toxic fuel tank, a senior U.S. military officer said here today. Video

Preliminary reports indicate the SM-3 missile struck its primary target, which was a tank full of toxic hydrazine rocket fuel carried aboard the 5,000-pound satellite, Marine Gen. James E. Cartwright, vice chairman of the Joint Chiefs of Staff, told reporters at a Pentagon news conference.

"The intercept occurred. … We're very confident that we hit the satellite," Cartwright said. "We also have a high degree of confidence that we got the tank."

Video shown to reporters depicts the satellite exploding at the point of contact with the missile. Cartwright said the visible fireball and the vapor cloud or plume around it suggest that the fuel tank was hit and the hydrazine had burned up.

"The high-definition imagery that we have indicates that we hit the spacecraft right in the area of the tank," Cartwright said.

However, he added, it probably would take another 24 to 48 hours of sifting through data "to get to a point where we are very comfortable with our analysis that we indeed breached the tank."

Radar sweeps of the satellite's debris field thus far show that no parts larger than a football survived the strike, Cartwright said. Post-strike surveillance shows satellite debris falling into the atmosphere above the Atlantic and Pacific Oceans, he said. Small remnants are likely to burn up in the atmosphere, never making it to the Earth's surface.

The U.S. State Department has provided updates on the situation to its embassies around the world, Cartwright noted. There are no reports of debris reaching the Earth, he said, adding that consequence-management crews are on standby to respond to such a circumstance, if required.

The SM-3 missile was launched by the USS Lake Erie, positioned northwest of Hawaii, at 10:26 p.m. EST yesterday, Cartwright said. Defense Secretary Robert M. Gates, who is on an overseas trip, gave the go-ahead to fire, Cartwright said.

The missile intercepted the satellite about 153 miles above the Earth, just before it began to enter the atmosphere, Cartwright said. Joint Space Operations Center technicians at Vandenberg Air Force Base, Calif, confirmed the satalitte's breakup about 24 minutes later.

The National Reconnaissance Office-managed satellite malfunctioned soon after it was launched in 2006, making it unresponsive to ground control. The satellite, orbiting Earth every 90 minutes or so, was expected to fall to Earth in February or March with its tank of hydrazine intact, possibly endangering human populations.

President Bush directed the Defense Department to engage the satellite just before it entered the atmosphere. U.S. officials decided to shoot down the satellite because of the danger posed by the hazardous hydrazine, Cartwright explained, noting the goal was for the missile to hit and rupture the tank of rocket fuel, causing the hydrazine to burn up harmlessly in the atmosphere, along with debris from the stricken satellite.

"So, you can imagine at the point of intercept last night there were a few cheers from people who have spent many days working on this project," Cartwright said.

AMERICAN FORCES PRESS SERVICE
NEWS ARTICLES

Gates Pleased by Mission's Success

By Fred W. Baker III
American Forces Press Service

HONOLULU, Feb. 21, 2008 – Defense Secretary Robert M. Gates was pleased when he learned a U.S. Navy missile hit the crippled reconnaissance satellite that was falling out of orbit and threatening to spill its toxic rocket fuel upon re-entry. Video

Defense officials could not immediately confirm that the fuel tank had been hit, and said they hope to know for sure by late tonight.

At 5:35 p.m. in Hawaii (10:35 p.m. EST), Gates received a call from Vice Chairman of the Joint Chiefs of Staff Marine Gen. James E. Cartwright and U.S. Strategic Command Commander Air Force Gen. Kevin P. Chilton delivering the news that the mission was a success, Pentagon Press Secretary Geoff Morrell said.

“The secretary was obviously very pleased to learn that, and he congratulated General Cartwright and General Chilton, as well as their teams, on a job well done,” Morrell said.

At about 1:40 p.m. EST yesterday, while en route to Hawaii from Washington, Gates held a conference call with the two generals and was told the conditions were “ripe” for an attempt. That is when the secretary gave the go-ahead for the Navy to take the shot, and he wished them luck in their attempt, Morrell said.

At about 10:26 p.m. EST, a U.S. Navy Aegis warship, the USS Lake Erie, fired a single modified tactical Standard Missile 3, hitting the satellite about 133 nautical miles over the Pacific Ocean as it traveled in space at more than 17,000 mph, according to a Defense Department statement.

The objective was to rupture the fuel tank to dissipate the roughly 1,000 pounds of hydrazine, a hazardous fuel that could pose a danger to people on Earth.

“The secretary, like all of us, is standing by to learn more how successful the intercept was,” Morrell said. “After all, the goal here was not just to hit the satellite. The goal here was to hit and destroy the fuel tank to eliminate it as potential danger to those of us here on Earth.”

Because of the relatively low altitude of the satellite at the time of the engagement, debris would have started re-entering the earth's atmosphere immediately, officials said, and nearly all of the debris will burn up on re-entry within two days.

Should any large pieces of the satellite’s debris make it to Earth, special teams are on alert and

positioned within the U.S. Pacific Command, Navy. Adm. Timothy J. Keating, PACOM commander, told reporters traveling with the secretary shortly after Gates landed here.

“(The teams are there) to lend assistance should parts of the satellite survive the missile impact and hit,” he said. “We don’t think the hydrazine container is going to hit. That’s why we’re shooting at it. But if it does, we’re prepared to assist with specially trained teams that are on alert at various places throughout our area of responsibility.”

Joint Chiefs of Staff Chairman Navy Adm. Mike Mullen also spoke to reporters here and said the shoot-down does not threaten any country and is not a new space race with any country.

"What we've tried to do from the beginning was be as open as possible about the intention," the chairman said during a news conference at Hickam Air Force Base. "We are taking the shot at what we hope will be an altitude that will minimize the amount of space debris that will occur. We've engaged governments throughout the world to tell them what our intentions are. We have been very transparent, very open in that regard."

The admiral made a point that the Navy's Standard Missile 3 had to be modified to fly the mission at all, and that it would be used only in this kind of emergency response to similar potential dangers.

Gates stopped in Hawaii on the first leg of a nine-day trip around the world aimed at reinforcing relationships with some countries he has yet to visit as defense secretary. In addition to U.S. Pacific Command here, the secretary will participate in annual bilateral talks with Australia, and discuss security matters with his counterparts in Indonesia, India and Turkey.

(Jim Garamone of American Forces Press Service contributed to this story.)

AMERICAN FORCES PRESS SERVICE
NEWS ARTICLES

Missile Defense System Works, Gates Says

By Fred W. Baker III
American Forces Press Service

EN ROUTE TO CANBERRA, Australia, Feb. 21, 2008 – The Navy's outer-atmosphere blasting of an ailing U.S. spy satellite this week proves that the nation's missile defense systems work, Defense Secretary Robert M. Gates said today.

"I think, actually, the question of whether this capability works has been settled. The question is: Against what kind of a threat (do we employ the technology)? How large a threat? How sophisticated a threat?" Gates said during a meeting with press after a tour of the Navy's USS Russell, used as back-up for the shootdown.

Gates toured the destroyer at U.S. Naval Station Pearl Harbor, Hawaii, during a stop on his way to Canberra, Australia, for the Australia-United States Ministerial Consultations.

Gates said there have been several successful attempts of the defense system, and the fact that it works also is validated by Congress' continued funding of the program for the past several years. In its beginnings, the program struggled for funding, and that is what many people remember about missile defense, he said.

"I think that people remember a time some years ago when missile defense was extremely controversial and a lot of people questioned whether it would work or not, and there was always a struggle in the Congress to get money for missile defense," Gates said in an interview with media traveling with him. "One of the significant changes that has taken place in Washington over the past few years has been a general recognition that the development of the system has proceeded, that it does have capability, and that it is increasingly sophisticated in terms of the kind of challenges that it may be able to beat -- although it still (is) very much designed for a very limited kind of threat."

While Congress and other leaders likely were aware of the missile defense system's capabilities, the general public still was not, Gates said. He said that a side benefit of the satellite shootdown was that the American public got to see a demonstration of the missile defense capabilities.

"Completely a side benefit of yesterday's action was to underscore the money that the Congress has been voting for this has resulted in a very real capability," Gates said. "I think the issue of whether it will work is behind us, and we just need to keep improving this capability."

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AMERICAN FORCES PRESS SERVICE
NEWS ARTICLES

Transparency of Satellite Shootdown Offers Model

By Jim Garamone
American Forces Press Service

CAMP H.M. SMITH, Hawaii, Feb. 21, 2008 – The way the United States handled the shootdown of a dead reconnaissance satellite last night offers a model of the transparency it encourages other countries more secretive about their military operations to adopt, the commander of U.S. Pacific Command said today.

Navy Adm. Timothy J. Keating pointed to the huge difference between last night's mission, aimed at destroying a satellite hurtling toward Earth, and the secret anti-satellite weapons test the Chinese conducted in January 2007.

"We've told people what we're going to do; we've told them how we're going to do it, and it's very open," Keating said.

The rationale behind the two missions was distinctly different, as well. President Bush decided to shoot down the satellite to preclude a danger to humans from hydrazine, a toxic fuel that would have been used to steer the satellite had it worked. The Chinese test, in contrast, was designed to test an anti-satellite weapon.

To carry out its mission, the U.S. fired a modified Standard Missile 3. The Chinese, in contrast, fired a specially designed anti-satellite weapon.

Keating told reporters he hopes the Chinese will learn from the U.S. model. "We would hope that they can see how to do an operation like this, emphasizing the transparency, emphasizing clear intentions, realizing --that while we don't have press embedded on the ship -- everybody knows what's going on," he said. "The Chinese did not do that when they launched their anti-satellite test. We hope there are some lessons that become apparent to them."

U.S. defense officials have long encouraged China and other nations around the world to be more transparent about their military operations. Defense Secretary Robert M. Gates encouraged more openness during his visit to China in November.

Keating visited China in January in an effort to bolster the two countries' military relationship and promote improved communication. He told Pentagon reporters in November that solid communication between the United States and China will help reduce the potential for misunderstanding. This will leave "less room for confusion that could lead to confrontation, to crisis," he said.

“That’s our goal,” he said. “To get there, we reduce the chance for misunderstanding.”

Joint Press Conference With Secretary of Defense Robert Gates, Australian Minister of Foreign Affairs Stephen Smith, and Australian Defense Minister Joel Fitzgibbon

John D. Negroponte, Deputy Secretary of State
Canberra, Australia
February 23, 2008

. . .

QUESTION: given the recent US demonstration of their abilities in that arena, with the recent satellite shootdown - has that played any role in your decision-making in that arena?

MINISTER OF DEFENSE FITZGIBBON: All I can say to our American friends, and in particular to Secretary Gates is that, we watched their activity, in terms of bringing down the satellite, with great interest. And can I say, Bob, nice shot.

[LAUGHTER]

FOREIGN MINISTER SMITH: Can I answer the second part of the question by saying that one of the things that Australia was grateful for, and I'm sure this was shared generally in the international community, was that the United States administration in advance let us know what it was proposing to do in terms of bringing down the satellite, let us know what the rationale for that was, to minimize debris and to minimize the chance or potential for toxic materials to get into our own atmosphere.

And I think the sharing of that information was - It was gratefully received, but it was also, I think, very valuable in terms of the international community understanding that particular issue.

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U.S. Department of Defense
Office of the Assistant Secretary of Defense (Public Affairs)
News Release

On the Web:
http://www.defenselink.mil/releases/release.aspx?releaseid=11709
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IMMEDIATE RELEASE

No. 0146-08
February 25, 2008

Satellite Debris Analysis Indicates Hydrazine Tank Hit

The Department of Defense announced today that based on debris analysis, officials are confident the missile intercept and destruction of a non-functioning National Reconnaissance Office satellite, achieved the objective of destroying the hydrazine tank and reducing, if not eliminating, the risk to people on Earth from the hazardous chemical.

"By all accounts this was a successful mission. From the debris analysis, we have a high degree of confidence the satellite's fuel tank was destroyed and the hydrazine has been dissipated," said Gen. James E. Cartwright, vice chairman of the Joint Chiefs of Staff.

"The successful satellite engagement was truly a collaborative effort from across the U.S. government, the armed forces, industry and academia working together to reduce the risk to human life," said Cartwright.

"The teamwork and interagency accomplishment associated with this operation was tremendous," said Cartwright. "Close workings with the National Security Council, State Department, Defense Department, NASA, Missile Defense Agency, National Reconnaissance Office, and Department of Homeland Security was absolutely key to the effort. The U.S. Navy, particularly the Pacific Fleet, was fundamental to the operation and did a superb job. The expertise of people from the U.S. Strategic Command, Air Force Space Command and Army Strategic Command was invaluable."

A single modified tactical Standard Missile-3 (SM-3), fired from the USS Lake Erie was used to engage the satellite. The remaining two modified missiles will be configured back to their original status as tactical missiles and the operational computer software programs aboard the Aegis ships will be re-installed.

The Joint Functional Component Command for Space Joint Space Operations Center at Vandenberg Air Force Base, Calif., is tracking less than 3,000 pieces of debris, all smaller than a football. The vast majority of debris has already reentered or will shortly reenter the Earth's atmosphere in the coming days and weeks. To date, there have been no reports of debris landing on Earth and it is unlikely any will remain intact to impact the ground.

U.S. Strategic Command space surveillance sensors continue to track and characterize the debris to ensure timely notifications are made, if necessary, with regards to ground or on-orbit debris-related risk.

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AMERICAN FORCES PRESS SERVICE
NEWS ARTICLES

Officials Declare Satellite Mission Successful

American Forces Press Service

WASHINGTON, Feb. 25, 2008 – Based on debris analysis, officials are confident the Feb. 21 missile intercept and destruction of a nonfunctioning National Reconnaissance Office satellite was successful in destroying the fuel tank and reducing risk to people on Earth, the Defense Department announced today.

The satellite's fuel tank contained hydrazine, a hazardous chemical that could have posed a risk to humans if the satellite or its fuel tank had reentered the atmosphere intact.

"By all accounts, this was a successful mission. From the debris analysis, we have a high degree of confidence the satellite's fuel tank was destroyed and the hydrazine has been dissipated," Marine Gen. James E. Cartwright, vice chairman of the Joint Chiefs of Staff, said in a DoD news release.

A single modified tactical Standard Missile-3 was fired from the USS Lake Erie to engage the satellite. Much of the debris from the satellite already has reentered the Earth's atmosphere or will reenter in the coming days and weeks, officials said. The Joint Functional Component Command for Space at the Joint Space Operations Center, at Vandenberg Air Force Base, Calif., is tracking less than 3,000 pieces of debris, all smaller than a football, which have not yet reentered the atmosphere. To date, there have been no reports of debris landing on Earth, and it is unlikely any will remain intact to hit the ground, officials said.

Cartwright praised the collaborative effort from the U.S. government, armed forces, industry and academia to destroy the satellite and reduce risk to human life.

"The teamwork and interagency accomplishment associated with this operation was tremendous," he said. "Close workings with the National Security Council, State Department, Defense Department, NASA, Missile Defense Agency, National Reconnaissance Office, and Department of Homeland Security was absolutely key to the effort. The U.S. Navy, particularly the Pacific Fleet, was fundamental to the operation and did a superb job. The expertise of people from the U.S. Strategic Command, Air Force Space Command and Army Strategic Command was invaluable."

U.S. Strategic Command space surveillance sensors continue to track and characterize the debris to ensure timely notifications are made, if necessary, with regard to debris-related risk on the ground or to objects in orbit, officials said.

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AMERICAN FORCES PRESS SERVICE
NEWS ARTICLES

Lake Erie Crew Describes Satellite Shot

By Jim Garamone
American Forces Press Service

PEARL HARBOR, Hawaii, Feb. 24, 2008 – The crewmembers of the USS Lake Erie were calm as they fired the latest shot heard round the world. The Aegis-class cruiser fired the missile Feb. 21 that destroyed a dead spy satellite that posed a threat to humans.

U.S. Navy Capt. Randall M. Hendrickson, commanding officer of the USS Lake Erie, describes the successful launch of a Standard Missile-3 at a non-functioning National Reconnaissance Office satellite as it traveled in space at more than 17,000 mph over the Pacific Ocean, Feb. 23, 2008. Defense Dept. photo by U.S. Navy Petty Officer 1st Class Chad J. McNeeley
(Click photo for screen-resolution image);high-resolution image available.

Navy Capt. Randall M. Hendrickson, the Lake Erie's commanding officer, spoke to reporters today aboard the ship, which has just returned from the mission. The visiting reporters are traveling with Navy Adm. Mike Mullen, the chairman of the Joint Chiefs of Staff, who visited the ship.

The captain said the crew worked intensively for a month and a half before the shootdown. "We kept working up with a team of government experts and technicians, as well as industry partners," Hendrickson said.

The group worked to gather information and modify the Standard Missile 3 and the Aegis weapon system, he said. They started tracking the satellite at different times to get radar cross-section data, which helped build the program software, Hendrickson said.

"Obviously there was a lot of anticipation building up each time we practiced, each time we tracked," he said.

The ship's weapons systems officer, Navy Lt. Cmdr. Drew Bates, said the rehearsals really helped when push came to shove. "By the time we did this, we had seen it a hundred times," he said. "We were practicing what to do in case things go wrong. Fortunately nothing went wrong. This went just the way it was designed to happen, and hats off to the industry team for giving the nation a system that was able to have the excess capability to do this."

The satellite was unlike any target the system was designed to go after, the captain said. The satellite was in orbit rather than on a ballistic trajectory. Also, the satellite was traveling at incredible speeds.

The Lake Erie left here the day officials announced President Bush's decision to try to shoot

down the satellite. Hendrickson said the ship was in position when the shuttle Atlantis returned from its mission.

The ship received the order that Defense Secretary Robert M. Gates had OK'd the mission at mid-morning on Feb. 21. "From that point on, the ship was very calm," Hendrickson said. "Obviously, the closer we got, there was a lot of anticipation. The firing team was very calm when we did it and, with the exception of the 'whoosh' when it went out of the launcher, it was just as scripted."

He said that when the missile's seeker opened its eyes it had the satellite "right dead center."

When the missile hit the satellite, "there was a lot of cheering" aboard the ship, he said.

The crew knew from the kinetic warhead imagery in the nose of the missile that it was a good hit, the captain said.

"The radar scope went wild," he said. "At that point, there was a lot of debris, a lot of pieces and, at that point, we thought we had a pretty good impact. Then that was confirmed by the aircraft that were airborne, the radars ashore and some other sensors that it was pretty much obliterated. Over the next three to four hours, a lot of it was burning up as it was coming down, which was the whole point of it."

Civilian experts from the Navy facility in Dahlgren, Va., and contractors from Lockheed Martin and from Raytheon Co. helped the crew prepare for the shot. But Navy sailors manned the consoles for the mission.

Everyone on the USS Lake Erie contributed, the captain said. "Whatever the task is, there's no small task on a ship," he said.

The reaction of the crew is unbelievable, said Command Master Chief Petty Officer Mack Ellis, the highest-ranking enlisted sailor on the Lake Erie. "Even the youngest sailor who didn't understand it at first, every time they walk somewhere and people know they are from Lake Erie, they say congratulations. It puts a smile of their face and makes their day."

110TH CONGRESS
2D SESSION

H. RES. 1004

Expressing sincere congratulations to the United States Navy and the Department of Defense for successfully intercepting the disabled National Reconnaissance Office satellite, NROL–21, on February 20, 2008.

IN THE HOUSE OF REPRESENTATIVES

FEBRUARY 27, 2008

Mr. ROHRABACHER (for himself and Mr. HUNTER) submitted the following resolution; which was referred to the Committee on Armed Services

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RESOLUTION

Expressing sincere congratulations to the United States Navy and the Department of Defense for successfully intercepting the disabled National Reconnaissance Office satellite, NROL–21, on February 20, 2008.

Whereas the National Reconnaissance Office satellite, NROL–21, was launched on December 14, 2006, into low-earth orbit;

Whereas the satellite lost power and ceased communication with ground controllers soon after reaching orbit;

Whereas the satellite could no longer make a safe re-entry into earth's atmosphere because of its loss of power;

Whereas about half of the satellite, roughly 2,800 pounds, would have survived re-entry, including a 1,000-pound hydrazine fuel tank;

Whereas hydrazine is a highly toxic substance and a risk to human health and safety;

Whereas there was an approximately one-in-four chance of the satellite, including the hydrazine tank, hitting land upon re-entry, dispersing toxic hydrazine, and risking human exposure;

Whereas the Department of Defense, being charged with the protection of the citizens of the United States, executed a technically challenging mission to intercept the satellite with the United States missile defense system and decrease the risk it posed to United States citizens and other inhabitants around the world;

Whereas the Department of Defense was transparent in communicating its plans and intent to the Congress, the American people, and, working with the Department of State, the broader international community;

Whereas a Navy cruiser, USS Lake Erie, accompanied by two destroyers, the USS Decatur and the USS Russell, fired a Standard Missile-3 toward the satellite; and

Whereas the missile successfully intercepted the satellite while traveling through space at more than 17,000 miles per hour, breaking the satellite, including the hydrazine tank, into pieces to safely burn up in the atmosphere: Now, therefore, be it

Resolved, That—

(1) the House of Representatives expresses sincere congratulations to the Department of Defense, Secretary of Defense Robert M. Gates, the Department of the Navy, and the crews of the USS Lake Erie, the USS Decatur, and the USS Russell, for

successfully intercepting the disabled National Reconnaissance Office satellite, NROL–21, on February 20, 2008; and

(2) it is the sense of the House of Representatives that this accomplishment safeguarded United States citizens and inhabitants around the world from potential harm.

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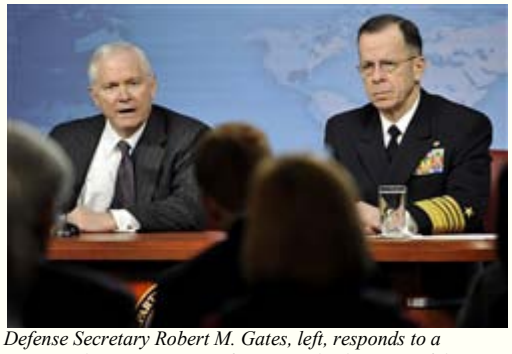
AMERICAN FORCES PRESS SERVICE
NEWS ARTICLES

Lack of Information About China's Military Spending Concerns Gates

By Sgt. Sara Moore, USA
American Forces Press Service

WASHINGTON, March 5, 2008 – China's announcement that it is increasing its military spending by almost 18 percent is a cause of concern because the nation's government hasn't been clear about how it will spend the money, Defense Secretary Robert M. Gates said here today.

China's announcement comes on the heels of the March 3 release of the 2008 China Military Power Report, which found that China spent more than three times its announced defense budget last year and is developing new capabilities that could have global implications.



Defense Secretary Robert M. Gates, left, responds to a question during a press conference with Chairman of the Joint Chiefs of Staff Adm. Mike Mullen at the Pentagon, March 5, 2008. Defense Dept. photo by Cherie A. Thurlby
(Click photo for screen-resolution image);high-resolution image available.

"Part of the issue is what we don't know," Gates said today at a Pentagon news conference. "I think that there's general agreement that the Chinese military budget that we see is only a portion of what the Chinese spend."

The United States has proposed engaging in strategic dialogue with Chinese officials to gain information about what the increase in the budget means and what their modernization programs mean, Gates said. In exchange, the United States would provide similar information to China.

"As you saw in the Chinese Military Power document, there's a wide range of activities under way, and we think having an ongoing dialogue with them about the meaning of all that would be very useful," he said.

Navy Adm. Mike Mullen, chairman of the Joint Chiefs of Staff, noted that beyond the 18 percent increase, the Chinese are spending money on research and development, and those investments need to be linked to strategic intent.

Gates also spoke about the United States' recent shoot-down of a crippled reconnaissance satellite in space, and China's concerns about that operation. The Chinese have so far made no requests for further information about the operation, he said, and the United States has been very open about the mission from the beginning.

He compared the U.S. operation to China's shoot-down of a satellite in 2007. The Chinese offered no advance notification of that operation, or any information afterward, Gates said. In

contrast, the United States was very open about the satellite operation from the start and took measures to limit the amount of debris that was left floating in space, he said.

Gates emphasized that the United States has no intention of developing anti-satellite technology, and that the recent operation was conducted to deal with a potential emergency.

National Aeronautics and Space Administration

Orbital Debris Quarterly News

Volume 12, Issue 2

April 2008

Inside...

A publication of

The NASA Orbital Debris Program Office

Satellite Breakups During First Quarter of 2008

A total of six satellite fragmentations were detected by the U.S. Space Surveillance Network (SSN) during the first three months of 2008, but fortunately all produced short-lived debris, unlike the two severe satellite breakups in the first quarter of 2007 (ODQN, April 2007, pp. 2-3). Only a small portion of debris from one of these latest events is expected to be still in orbit by year's end.

The first three breakups occurred during a month's span between mid-January and mid-February and involved one spacecraft and two launch vehicle upper stages which were experiencing catastrophic orbital decay from highly elliptical orbits with very low perigees. In all cases, the debris detected by the SSN decayed very rapidly, before official cataloging could be accomplished.

Cosmos 2105 (International Designator 1990-099A, U.S. Satellite Number 20941) shed about six pieces on 16 January when its perigee altitude had dropped well below 100 km. The spacecraft decayed approximately 9 hours after the release, and the debris is assessed to have also reentered that day.

On 27 January the third stage of the CZ-3A launch vehicle (International Designator 2007-051B, U.S. Satellite Number 32274), which lifted China's first lunar probe into a temporary Earth orbit on 24 October 2007, reportedly broke-up into 30-40 fragments in an orbit of 80 km by 6035 km. The stage fell back to Earth the following day, and no debris is believed to have remained in orbit for very long.

The third event involved the final stage of the launch vehicle (International Designator 1994-051D, U.S. Satellite Number 23214) which placed the Molniya 3-46 communications satellite into orbit on 23 August 1994. Only two debris were detected as the stage decayed through an orbit of 115 km by 5530 km on 17 February. Reentry of the stage occurred early on 19 February.

On 14 February the U.S. Government announced its intention to attempt to destroy the propellant tank of the USA-193 spacecraft (International Designator 2006-057A, U.S. Satellite Number 29651) at a very low altitude, shortly before the vehicle would naturally reenter the atmosphere. Since the spacecraft had failed immediately after

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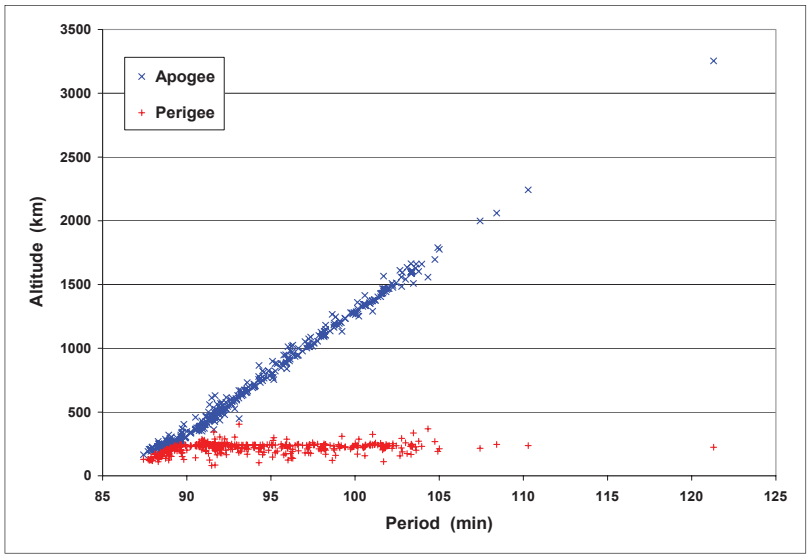

Figure 1. This Gabbard diagram depicts the orbits of 360 debris (5 cm and larger) from USA-193 as of 22 February 2008.

Breakups

continued from page 1

reaching Earth orbit, the tank's hydrazine contents remained unused and in a frozen state. Detailed reentry survivability analyses indicated that the tank and its contents would survive a natural reentry and might pose a threat of human casualty if people encountered the hydrazine cloud released by the tank after impact.

USA-193 was engaged on 21 February (UTC) at an altitude just below 250 km and was severely fragmented via a hypervelocity collision. The majority of the debris fell to Earth within an hour of the break-up, and the remaining debris were left in short-lived orbits. Figure 1 indicates the distribution of 360 orbital debris on 22 February. By the end of March only a small percentage of the original debris were still in orbit, and the reentry of the last fragment was expected this summer.

The next fragmentation occurred on 14 March when Cosmos 2421 (International Designator 2006-026A, U.S. Satellite Number 29247) shed upwards of 300 debris. The vehicle was the 50th of a class of spacecraft which debuted in 1974 and marked the 22nd breakup in the series. At the time of the breakup, Cosmos 2421 was in an orbit of approximately 400 km by 420 km with an inclination of 65 degrees. The spacecraft appeared to have terminated its mission in mid-February and was in a state of natural orbital decay at the time of breakup. The cause of the numerous fragmentations of this class of satellites has not been revealed by the Russian Federation.

The final breakup of the quarter took place on 21 March and involved another rocket body experiencing an early, atmospheric-induced breakup while undergoing catastrophic orbital decay from a highly eccentric orbit. The Atlas 5 Centaur upper stage (International Designator 2007-046B, U.S. Satellite Number 32259) was in an orbit with a perigee altitude of less than 100 km at the time of the event. The primary remnant and all debris were assessed to have reentered by the following day. ♦

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NASA Scientist Receives Meritorious Civilian Service Award

HOUSTON—Nicholas Johnson, NASA chief scientist for orbital debris, has received the Department of Defense Joint Meritorious Civilian Service Award for his critical contributions to the successful interception of a non-functional DoD satellite.

The award was presented July 30 at NASA's Johnson Space Center in Houston by Gen. Kevin Chilton, commander of the U.S. Strategic Command and former NASA astronaut.

"It took a lot of people to make it happen," said Chilton. "The guy who helped facilitate coming to a decision was Nick Johnson, a true unsung hero."

Johnson's analysis was critical in identifying the risks associated with the uncontrollable re-entry of the National Reconnaissance Office satellite, known as USA-193, that was predicted to enter Earth's atmosphere late February to early March 2008. His expertise proved vital to U.S. Strategic Command's success in planning Operation BURNT FROST, a plan to mitigate possible dangers posed by the satellite's re-entry.

"All of us in our NASA family are proud of Nick Johnson and the contributions he made to the successful satellite interception," said JSC Director Mike Coats. "Nick is considered our foremost orbital debris expert, and his expertise was instrumental in the decision and successful execution of this difficult mission."

USA-193 was launched in December 2006 into a low Earth orbit. The spacecraft soon suffered a catastrophic failure and could not respond to ground commands. The spacecraft contained a titanium tank with about 1,000 pounds (450 kg) of hydrazine for planned orbital maneuvers. The orbit of the spacecraft gradually decayed throughout 2007.

A U.S. government interagency effort began in January 2008 to address issues associated with the situation. Issues included evaluating the risk the spacecraft would pose to a populated area if it re-entered in an uncontrolled manner, determining the ability of the United States to mitigate

any potential re-entry risk, and assessing the potential risk to in-orbit spacecraft including the International Space Station and the space shuttle. The NASA administrator designated Johnson as NASA's technical liaison to the interagency working group.

NASA provided technical analyses of the situation including an assessment of the survivability of the hydrazine tank and its contents during a natural re-entry, calculation of the statistical risk posed to people from hydrazine released after tank impact, characterization of the amount of debris following a successful elimination of USA-193 and how long that debris would remain in orbit, and an assessment of collision risks between the generated debris and the space station or space shuttle. Johnson's contributions to a U.S. Strategic Command decision brief led to presidential authorization to conduct an intercept of USA-193.

On Feb. 14, 2008, the U.S. government announced its intention to attempt to mitigate the threat posed by USA-193 and its hazardous hydrazine by destroying the spacecraft with a missile launched from a U.S. naval vessel. On Feb. 19, Johnson made a presentation on behalf of the United States at the United Nations in Vienna, Austria, to describe the anticipated results of the engagement and to confirm that such action was consistent with all U.S. national and international orbital debris mitigation guidelines.

Space shuttle Atlantis landed the morning of Feb. 20. That evening the threat from USA-193 was eliminated by a missile fired from the USS Lake Erie from a position north of Hawaii. As designed, the engagement ensured that the vast majority of the debris which remained in orbit would be short-lived. As of June only two small pieces were known to be in orbit and they will re-enter within the next few months.

Johnson previously received the NASA Distinguished Service Medal for his efforts in this national undertaking. He is a scientist in the Astromaterials Research and Exploration Science Directorate at JSC.

Jonathan's Space Report
No. 602 2008 Oct 26, Baltimore/STScI, Maryland

2008 Oct 26, Baltimore/STScI, Maryland

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Orbital Debris

The last cataloged piece of orbital debris from USA 193, the NRO satellite
destroyed by an Aegis missile, reentered on Oct 9.

Currently cataloged in low orbit are 174 pieces of debris from the Russian US-PU satellite Kosmos-2421, which disintegrated on Mar 14; 235
pieces from the Chinese ZY-1 satellite, which exploded on 2007 Feb 18; and 2339 pieces from the Jan 2007 Chinese antisatellite test.

34 pieces of debris from the Briz-M stage which exploded on 2007 Feb 19
are now cataloged in orbit, but there are probably many more.

The picture changes when we focus on the lowest part of Low Earth Orbit,
the region below the International Space Station. Although many spacecraft are launched to Low Earth Orbit, they don't usually stay there long and the actual population at any one time is surprisingly sparse
and (except for debris) dominated by human-spaceflight-related activities.

As of Oct 12, these were the spacecraft with an average altitude of 355 km
or less:

Shenzhou 7 related objects:
178 x 246 km Shenzhou 7 second stage rocket
326 x 336 km Shenzhou 7 subsatellite
328 x 334 km Shenzhou 7 GC (orbital module)

ISS related objects:
235 x 238 km Early Ammonia Servicer
248 x 266 km Soyuz TMA-13
325 x 331 km Unidentified debris piece from Jul 11 EVA (1998-67BG)
350 x 355 km International Space Station

Active payloads:
321 x 325 km CHAMP gravity research satellite

Other large objects:
166 x 412 km Delta 335 (GeoEye 1 rocket)
253 x 374 km S5M stage (Sich 1M rocket)
310 x 321 km Blok E stage (Kosmos-1093 rocket)
321 x 340 km Strela stage

Debris:
53 pieces of debris from Kosmos-2421
4 other debris objects

So, clearly, the Kosmos-2421 debris is the biggest hazard to astronaut-carrying spacecraft at the height of ISS and below. Between 355 and 450 km, the picture changes slightly: there are a further 108 pieces of Kosmos-2421 debris and 25 other pieces of debris, 8 rocket stages, 6 probably active satellites (Genesat 1, NFIRE, TRMM, Quickbird
2, Orbview 3, Mimosa) and 10 probably dead ones (Tselina-D, ROSAT, WIRE,
Tacsat 2, Meteor No. 12, Shtil'-1, Kosmos-1484, Gruzomaket, and DAPP 12). Above 450 km, LEO quickly gets considerably more crowded.

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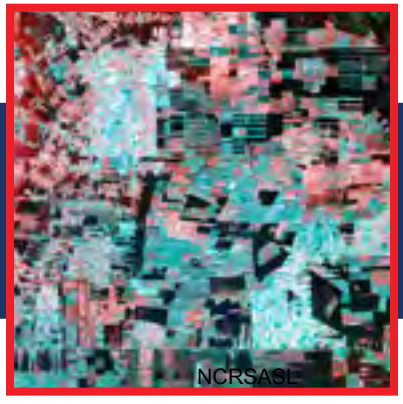

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Selected bills and legislation

- H.R. 6063: National Aeronautics and Space Administration Authorization Act of 2008
- S. 3001: Duncan Hunter National Defense Authorization Act for Fiscal Year 2009
- H.R. 6984: Federal Aviation Administration Extension Act of 2008

Selected interviews

- Mike Gold - Corporate Counsel, Bigalow Aerospace
- Tracey L. Knutson - Attorney, Knutson & Associates
- Glenn H. Reynolds - Professor of Law, University of Tennessee College of Law

Selected primary sources

- Hearing: China's Proliferation Practices, and the Development of its Cyber and Space Warfare Capabilities
- Conference on Disarmament Statements
- Statement of Intent Regarding the International Lunar Network

Selected guest bloggers

- Hiroshi Kiyohara - Chief Attorney, Musashi International Law Offices
- Col. M.V. "Coyote" Smith - United States Air Force
- Parviz Tarikhi - Department Head, Mahdasht Satellite Recieviing Station

Selected court cases

- Enomoto v. Space Adventures
- Ladman Partners Inc. v, Globalstar Inc.
- Bowe v. Worldwide Flight Services
- Ary v. United States
- American Air Transport Association of America v. Cuomo

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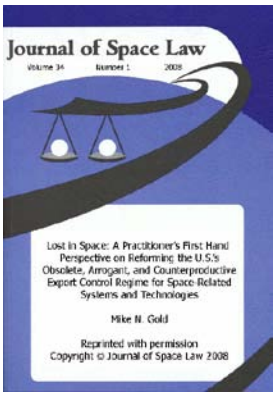

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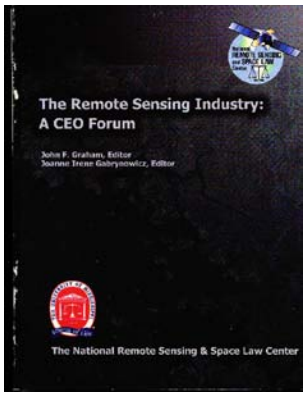

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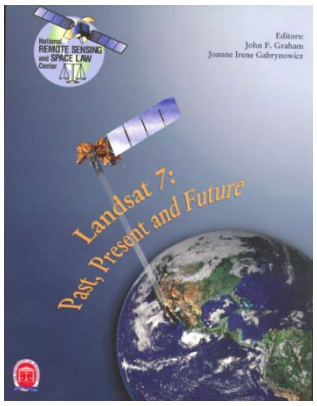

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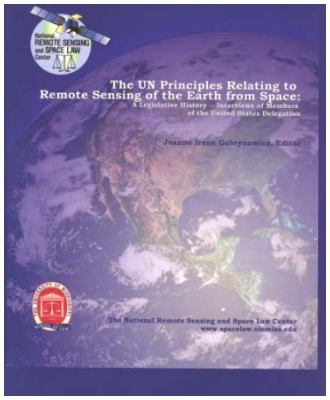

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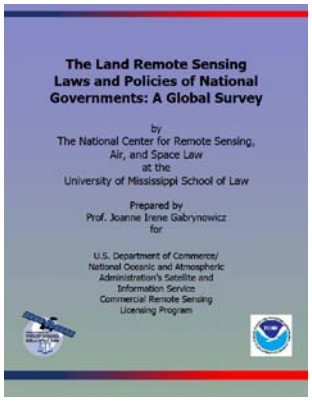

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