

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

NOTICE: (09-)

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA): Nuclear Spectroscopic Telescope Array (NuSTAR) Mission

AGENCY: National Aeronautics and Space Administration (NASA)

ACTION: Finding of No Significant Impact (FONSI)

SUMMARY: Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 43321 *et seq.*), the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), and NASA policy and procedures (14 CFR Part 1216 Subpart 1216.3), NASA has made a Finding of No Significant Impact (FONSI) with respect to the proposed NuSTAR mission. The proposed action would be the launch of the NuSTAR mission on a Pegasus XL launch vehicle from the Reagan Test Site (RTS) at U.S. Army Kwajalein Atoll (USAKA), the Republic of the Marshall Islands (RMI) in August 2011. The only other alternative that was considered in detail was No Action.

DATES: Written comments on this FONSI should be submitted to Mark Sistilli at the address provided below and must be postmarked no later than 30 days from publication of this FONSI. While hard copy comments are preferred, NASA will accept e-mail addressed to Mark Sistilli at the address provided below so long as the e-mail is sent no later than 30 days from publication of this FONSI.

ADDRESSES: The environmental documentation that supports and serves as a basis for this FONSI may be reviewed at the locations listed under the supplementary information in this notice.

FOR FURTHER INFORMATION CONTACT: Mr. Mark Sistilli, NASA Headquarters, Science Mission Directorate, Astrophysics Division, NASA Headquarters, 300 E St SW, Mail Suite 3Y33, Washington, D.C., 20546-0001, Phone: 202-358-2242, E-mail: mark.j.sistilli@nasa.gov.

The Final EA is also available at <http://oim.hq.nasa.gov/oia/emd/ep.html>.

SUPPLEMENTARY INFORMATION:

The proposed NuSTAR spacecraft has been reviewed in accordance with the Routine Payload criteria established by the "Final Environmental Assessment for Launch of NASA Routine Payloads on Expendable Launch Vehicles from Cape Canaveral Air Force Station Florida and Vandenberg Air Force Base California," (NRP EA) dated June 2002 and FONSI dated June 18, 2002. This review shows that the NuSTAR spacecraft meets all of the Routine Payload Criteria, with the exception of criteria 3 which specifies the launch vehicle and launch site conditions.

The baseline launch vehicle for NuSTAR is the Pegasus XL, which is also covered under the Routine Payload criteria. However, the launch site proposed is USAKA, in the RMI.

Council of Environmental Quality (CEQ) regulations encourages adoption of existing documents where applicable ("...an agency may adopt appropriate environmental documents prepared by another agency (Sec. 1506.3)"). In addition, NASA Procedural Requirements (NPR) 8580.1, section K.2.17 encourages the adoption of other agency existing NEPA documents. The environmental impacts of the launch of spacecraft from USAKA have been reported in previous NEPA documentation, therefore these NEPA documents are hereby incorporated by reference in this FONSI. This FONSI formally adopts existing FAA and DOD environmental documentation for Pegasus launches from USAKA.

At a minimum, NASA will take no final action prior to 30 days following the publication of this FONSI. Public comments on the environmental aspects of the proposed NuSTAR mission are hereby solicited and will be considered before NASA makes its final decision.

The NuSTAR mission was proposed and selected in response to NASA's Announcement of Opportunity for the Explorer Program in 2003. The Explorer program provides frequent, low-cost access to space missions for small-to mid-sized spacecraft. The Explorer program enables the definition, development and implementation of mission concepts through a variety of modes to meet the need of the scientific community and the NASA space science enterprise. NuSTAR's

scientific goals include helping scientists answer fundamental questions about the universe, such as:

1. How black holes are distributed throughout the cosmos?
2. How the elements of the universe were created?
3. What powers the most extreme active galaxies?

With answers to these and other questions, NuSTAR would expand NASA's understanding of the origins and destinies of stars and galaxies.

NuSTAR would study the sky through the use of high energy x-rays. It consists of a single spacecraft which would be placed into an equatorial orbit around the Earth. The objective of the NuSTAR mission is to conduct a census for black holes on all scales, achieved through deep, wide-field surveys of extragalactic fields and the Galactic center, map radioactive material in young supernova remnants in order to study the birth of the elements and to understand how stars explode, to expose relativistic jets of particles from the most extreme active galaxies in order to understand what powers giant cosmic accelerators, to study cosmic ray origins and the extreme physics around collapsed stars and would respond to targets of opportunity including supernovae and gamma-ray bursts.

NuSTAR would achieve its science objectives with a combination of surveys and pointed observations. It would consist of a single instrument containing two identical grazing incidence hard X-ray telescopes that would effectively enlarge the X-ray collecting area. The grazing incidence mirrors would focus onto two shielded solid-state pixel detectors, separated by a mast that would extend the focal length to ten meters (33 feet) after launch. A laser metrology system (class 3B) would monitor the mast alignment and remove mast flexure that would ease mast stability requirements. The optics would extend the frequency range and field of view over that achievable with standard metal surfaces. Cadmium Zinc Telluride (CdZnTe) detectors would provide excellent spectral resolution and high quantum efficiency without requiring cryogenic

operation. There would be a single mechanical interface to the 3-axis stabilized spacecraft bus provided by Orbital Sciences Corporation, who also manufactures the Pegasus launch vehicle. NuSTAR would launch from United States Army Kwajalein Atoll, Republic of the Marshall Islands, aboard a single Pegasus XL launch vehicle in August 2011.

NuSTAR Adoption of Existing Environmental Documentation Applicability

The Pegasus XL launch vehicle would be processed and the NuSTAR spacecraft would be integrated to the launch vehicle at Vandenberg Air Force Base (VAFB), California. The Pegasus would be attached to its dedicated L-1011 aircraft at VAFB, and then ferried to RTS for launch. Limited testing operations on the spacecraft would be conducted at RTS. On the day of launch, the L-1011/Pegasus would depart from RTS and then the Pegasus would be released from the L-1011 aircraft at an altitude of approximately 35,000 to 45,000 feet over the Pacific Ocean, at a point southwest of the Kwajalein Atoll.

RTS is located on the USAKA, a subordinate command of the U.S. Army Space and Missile Defense Command, located in the RMI, approximately 3,700 kilometers (2,000 nautical miles) southwest of Hawaii. USAKA consists of all or portions of 11 of the 100 islands that enclose a 2,850 square kilometer (1,100 square mile) lagoon, the largest lagoon in the world. Kwajalein is one of 11 islands in the Marshall Islands leased by the U.S. government.

The U.S. Department of Transportation (DOT) Federal Aviation Administration (FAA) has analyzed the potential impacts of Pegasus launches at RTS in previous documents (FAA, 1994, OSC, 1999, and FAA, 2004) and has determined that the activities associated with the Pegasus operations at RTS will not individually or cumulatively significantly impact the quality of the human or natural environment.

NASA has analyzed the potential impacts of missions with spacecraft that are considered routine payloads in an environmental assessment (NRP EA). Spacecraft defined as routine

payloads utilize materials, quantities of materials, launch vehicles and operation characteristics that are consistent with normal and routine spacecraft preparation and flight activities. The environmental impacts of launching routine payloads fall within the range of routine, ongoing and previously documented impacts that have been determined not to be significant.

Spacecraft covered by the NRP EA meet specific criteria ensuring that the spacecraft and its operation and decommissioning do not present any new or substantial environmental or safety concerns. The NuSTAR mission meets the criteria for a NASA routine payload (NASA, 2009) with the exception of criteria 3 concerning launch site conditions that are covered in DOT environmental documentation (FAA, 1994, OSC, 1999, and FAA, 2004). The mission does not present any unique or unusual circumstances that could result in new or substantial environmental impacts.

Based on the analyses set forth in the NRP EA and previous FAA documents, NASA has determined that the environmental impacts associated with the NuSTAR mission will not individually or cumulatively have a significant impact on the quality of the human environment. Therefore, an Environmental Impact Statement is not required. In making this determination, NASA not only considered that the NuSTAR mission satisfies the criteria set forth in the NRP EA for spacecraft impacts, but it considered the potential site specific impacts of the NuSTAR mission set forth and detailed in the DOT documentation identified above.

The environmental documentation that supports and serves as a basis for this FONSI may be reviewed at the following locations:

Alele Public Library
P.O. Box 629
Majuro, Republic of the Marshall Islands 96960

Grace Sherwood and Roi-Namur Libraries
P.O. Box 23
Kwajalein, Marshall Islands APO, A.P. 96555

The environmental documentation may also be examined at the following locations by contacting the pertinent Freedom of Information Act Office:

- (a) NASA, John F. Kennedy Space Center, FL 32899 (321-867-2745)
- (b) NASA, Ames Research Center, Moffett Field, CA 94035 (650-604-3273);
- (c) NASA, Dryden Flight Research Center, Edwards, CA 93523 (661-276-2704);
- (d) NASA, Glenn Research Center at Lewis Field, Cleveland, OH 44135 (1-866-404-3642);
- (e) NASA, Goddard Space Flight Center, Greenbelt, MD 20771 (301-286-4721);
- (f) NASA, John C. Stennis Space Center, MS 39529 (228-688-2118);
- (g) NASA, Lyndon B. Johnson Space Center, Houston, TX 77058 (281-483-8612);
- (h) NASA, Langley Research Center, Hampton, VA 23681 (757-864-2497);
- (i) NASA, Michoud Assembly Facility, New Orleans, LA 70189 (504-257-2629); and
- (j) NASA, White Sands Test Facility, Las Cruces, NM 88004 (505-524-5024).
- (k) Jet Propulsion Laboratory, Visitors Lobby, Building 249, 4800 Oak Grove Drive, Pasadena, CA 91109.

Limited hard copies of the specific environmental documentation named below that supports this FONSI are available on a first-request basis by contacting Mark Sistilli at the address, telephone number, and e-mail address indicated wherein.

References

A complete list of all references cited in this rule is available on the Internet at <http://oim.hq.nasa.gov/oia/emd/ep.html> or by emailing a request to nepa@hq.nasa.gov.



Edward J. Weiler
Associate Administrator for
Science Mission Directorate



National
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Routing Slip

	Mail Suite	Name	Action	
			Approval	
1	EMD	Ms. Callister (concur on route slip) <i>KC 6/4/09</i>	Call me	
			Concurrence	<input checked="" type="checkbox"/>
2	EMD	Mr McNeill (concur on route slip) <i>[Signature]</i>	File	
			Information	
3	EMD	Mr. Leatherwood (concur on route slip) <i>[Signature]</i>	Investigate and Advise	
			Note and Forward	
4	OGJ	See attached SMD routing slip	Note and Return	
			Per Request	
5	OICMS	Ms. Parker (concur on route slip) <i>[Signature]</i>	Per Phone Conversation	
			Recommendation	
6	OI	Ms. Dominguez (concur on route slip) <i>[Signature]</i>	See me	
			Signature	
7			Circulate and Destroy	

RE: Nuclear Spectroscopic Telescope Array (NuSTAR) FONSI

I have reviewed the Finding of No Significant Impact (FONSI) and in my opinion it adequately and accurately reflects the potential environmental impacts that might occur. OGC has been consulted and concurs with the FONSI approach (see attached Routing Slip for OGC concurrence).

Background: NuSTAR will be launched from a Pegasus XL from the Reagan Test Site at U.S. Army Kwajalein Atoll (USAKA), the Republic of the Marshall Islands in August 2011. The NuSTAR spacecraft has been reviewed in accordance with the NASA Routine Payload criteria and the review shows that NuSTAR meets all of the Routine Payload Criteria, with the exception of the launch site location. The environmental impacts of the launch of spacecraft from USAKA have been reported in previous NEPA documentation, therefore these NEPA documents can be incorporated by reference in the FONSI. The FONSI formally adopts existing FAA and DOD environmental documentation for Pegasus launches from USAKA. CEQ and NASA regulations encourage adoption of existing documents were applicable.

Name <i>Kathleen Callister</i>	Tel. No. (or suite) & Ext.
Kathleen Callister	358-1953
Suite (or other designation)	Date
EMD Room 5B28	June 3, 2009

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Routing Slip

	Mail Suite	Name	Action	
				x
1	SMD	Mark Sistilli <i>MS</i>	Approval	
		<i>6/1/09</i>	Call me	
2	EMD	Kathleen Callister <i>K.C.</i>	Concurrence	
		<i>6/3/09</i>	File	
3	OGC	Dave Stewart <i>DCS</i>	Investigate and Advise	
		<i>6/4/09</i>	Note and Forward	
4	SMD	Rick Howard <i>RH</i>	Note and Return	
		<i>6/15/09</i>	Per Request	
5	SMD	Michael Luther <i>ML</i>	Per Phone Conversation	
		<i>6/15/09</i>	Recommendation	
6	SMD	Chuck Gay <i>CG</i>	See me	
		<i>6/1/09</i>	Signature	
7	SMD	Ed Weiler <i>EW</i>	Circulate and Destroy	
		<i>6/3</i>		

National Environment Policy Act (NEPA):

Nuclear Spectroscopic Telescope Array (NuSTAR) Mission

*ED,
THIS LOOKS FINE.
- Chuck*

Name

Paul VanDamme
Suite (or other design)

SMD

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June 1, 2009