

April 11, 2012

Reply to Attn of: 417

## MEMORANDUM FOR THE RECORD

The National Environmental Policy Act (NEPA) Compliance for Geostationary Operational Environmental Satellites (GOES-R Series (R, S, T, U)) Program

### 1.0 Introduction

The NEPA of 1969, as amended (42 U.S.C. 4321, *et seq.*), requires Federal agencies to consider the environmental impacts of a project in their decision making process. To comply with NEPA and associated regulations (the Council on Environmental Quality (CEQ) 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 prepared an Environmental Assessment (EA) for routine payloads launched on expendable launch vehicles (Ref: *Environmental Assessment (Final) for Launch of NASA Routine Payloads*, November 2011). The 2011 NASA Routine Payload EA (2011 NRPEA) assesses the environmental impacts of missions launched with spacecraft that are considered routine payloads from existing launch facilities at Cape Canaveral Air Force Station (CCAFS), Florida, Vandenberg Air Force Base (VAFB), California, the United States Army Kwajalein Atoll/Reagan Test Site (USAKA/RTS) in the Republic of the Marshall Islands (RMI), NASA's Wallops Flight Facility (WFF), Virginia, and the Kodiak Launch Complex (KLC), Alaska.

Spacecraft defined as routine payloads utilize materials, quantities of materials, launch vehicles, launch sites, and operational characteristics that are consistent with normal and routine spacecraft preparation and flight activities at VAFB, CCAFS, USAKA/RTS, WFF, KLC, and the Kennedy Space Center. The environmental impacts of launching routine payloads from these sites fall within the range of routine, ongoing and previously documented impacts that have been determined not to be significant. Spacecraft within the scope of this EA meet specific criteria ensuring that the spacecraft, its operation and decommissioning, do not present any new or substantial environmental or safety concerns.

To determine the applicability of a routine payload classification for a mission, the mission is evaluated against the criteria defined in the EA using the Routine Payload Checklist (RPC).

### 2.0 Mission Description

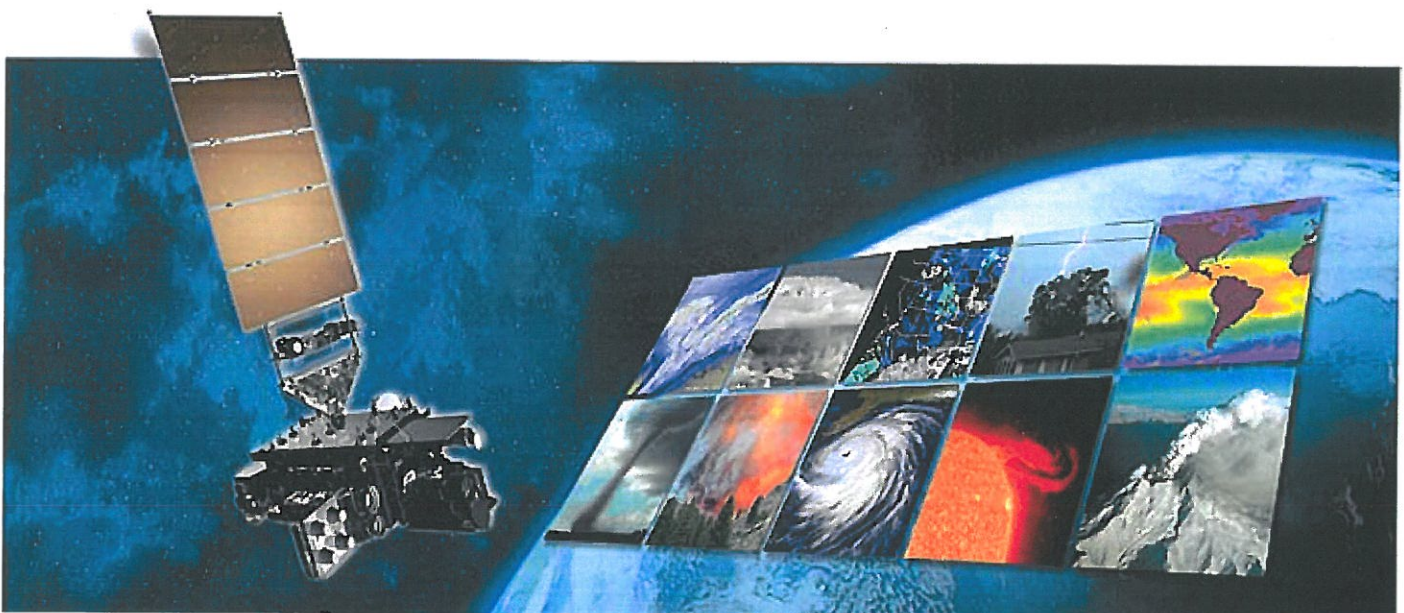
The Geostationary Operational Environmental Satellite-R Series (R, S, T, U) is the next generation of geostationary weather satellites. The first in the series, GOES-R, is scheduled to

launch in 2015. Launches for GOES-S and T are currently scheduled for 2017 and 2019, respectively. The program is a collaborative development and acquisition effort between the National Oceanic and Atmospheric Administration (NOAA) and NASA. The GOES-R series satellites will provide continuous imagery and atmospheric measurements of Earth's Western Hemisphere and space weather monitoring. They will be the primary tool for the detection and tracking of hurricanes and severe weather. The advanced spacecraft and instrument technology used on the GOES-R series will result in more timely and accurate weather forecasts. They will improve support for the detection and observations of meteorological phenomena and directly affect public safety, protection of property, and ultimately, economic health and development.

The GOES-R series spacecraft will be 3-axis stabilized and capable of the fine pointing control necessary for mission requirements. The primary instrument is the Advanced Baseline Imager (ABI) that will provide climatic, synoptic, and mesoscale imagery for global and Continental United States (CONUS) forecasting and severe weather warning. Secondary instruments include the Extreme Ultraviolet and X-ray Irradiance Sensor (EXIS), the Solar UltraViolet Imager (SUVI), the Space Environment In-Situ Suite (SEISS), and the Geostationary Lightning Mapper (GLM). Additionally, GOES-R will provide a set of auxiliary communications services in support of the GOES Rebroadcast Service (GRB), Data Collection System (DCS), High Rate Information Transmission/Emergency Managers Weather Information Network (HRIT/EMWIN), and Search and Rescue Satellite Aided Tracking (SARSAT).

Ground based facilities used to provide command, control and communications to the spacecraft and instruments include: 1) NOAA's Wallops Command and Data Acquisition Station (WCDAS) at Wallops, Virginia; 2) Fairbanks Command and Data Acquisition Station at Fairbanks, Alaska; 3) GOES-R Remote Backup Station (RBU) at Fairmont, West Virginia; 4) Satellite Operations Control Center (SOCC) located at NOAA Satellite Operations Facility (NSOF) in Suitland, Maryland.

GOES-R will be launched on an Atlas V launch vehicle from Cape Canaveral Air Force Station.



### 3.0 NASA Routine Payload Determination

The components utilized in the GOES-R series spacecraft are made of materials normally encountered in the space industry. The GOES mission will not utilize radioactive sources, will not carry any pathogenic organisms nor will it return samples to Earth. There is no planned reentry for the GOES spacecraft.

The GOES-R series has been evaluated against the 2011 NRPEA, using the RPC (see enclosed Evaluation Recommendation Package). The site specific impacts of the GOES launch vehicle/launch site combination are addressed in the EA. The site specific impacts of the ground facility work are addressed in other NEPA documentation. Based on the analyses set forth in the 2011 NRPEA and the ground facility NEPA documentation, NASA has determined that the environmental impacts associated with the GOES-R series will not individually or cumulatively have a significant impact on the quality of the human environment and that a routine payload classification for the GOES R series is applicable.

As the subsequent launches approach for GOES S, T and U, NASA will again review the missions in the context of the EA to assess whether the routine payload categorization is still accurate.



George W. Morrow  
Director of Flight Projects

4/2/12

Date



Christopher J. Scolese  
Director

11 APRIL 2012

Date

Enclosure

Reference

<http://www.goes-r.gov/index.html>

# **EVALUATION RECOMMENDATION PACKAGE**

**Record of Environmental Consideration  
Routine Payload Checklist  
NEPA Environmental Checklist**

Enclosure

# RECORD OF ENVIRONMENTAL CONSIDERATION

1. Project Name: Geostationary Operational Environmental Satellites (GOES-R Series (R,S, T, U) Program
2. Description/location of proposed action: To provide continuous weather imagery and monitoring of meteorological data for the United States, Latin America, much of Canada and most of the Atlantic and Pacific ocean basins. GOES will provide critical atmospheric, oceanic, climatic, and solar products supporting weather forecasting and warnings.

Date and/or Duration of project: Launch - NET November 2014

3. It has been determined that the above action:

a. Is adequately covered in an existing EA or EIS.  
Title: Environmental Assessment (Final) for Launch of NASA Routine Payloads  
Date: November 2011

b. Qualifies for Categorical Exclusion and has no special circumstances which would suggest a need for and Environmental Assessment.  
Categorical Exclusion: \_\_\_\_\_

c. Is exempt from NEPA requirements under the provisions of:

d. Is covered under EO 12114, not NEPA.

e. Has no significant environmental impacts as indicated by the results of an environmental checklist and/or detailed environmental analysis.  
(Attach checklist or analysis as applicable)

f. Will require the preparation of an Environmental Assessment.

g. Will require the preparation of an Environmental Impact Statement.

h. Is not federalized sufficiently to qualify as a major federal action.

Beth Montgomery  
Beth Montgomery ~~NEPA Program Manager~~, Code 250

3/15/2012  
Date

Gregory A. Mandt  
Gregory Mandt Program Manager, Code 410

3/27/2012  
Date

**APPENDIX C.**  
**NASA ROUTINE PAYLOAD EVALUATION AND**  
**DETERMINATION PROCESS AND CHECKLIST**

After a proposed spacecraft mission is sufficiently well formulated (usually the Phase B design study), the Sponsoring Entity, in coordination with the local Environmental Management Office (EMO), will prepare an environmental evaluation. An environmental evaluation is a preliminary review that determines what aspects of the proposal are of potential environmental concern. The environmental evaluation also assists in determining the appropriate level of National Environmental Policy Act (NEPA) documentation (i.e., environmental assessment [EA], or environmental impact statement [EIS]) for the proposal. The local EMO uses a comprehensive checklist to provide a level of rigor to this early evaluation of the proposal, helping to ensure that pertinent considerations are not overlooked. Local EMO review of the Routine Payload Checklist (RPC, below) forms the basis for evaluating the applicability of a NASA Routine Payload (NRP) spacecraft classification for a proposed mission.

The local EMO uses the completed RPC (and required attachments) to evaluate the proposed mission against the NRP EA criteria. If the EMO evaluation of the RPC indicates that a NRP categorization may be appropriate, the Sponsoring Entity documents this in an Evaluation Recommendation Package (ERP). The ERP is then processed for review and approval in accordance with established National Aeronautics and Space Administration (NASA) procedures and guidelines. If approved, the ERP would be attached to a Record of Environmental Consideration (REC).

The Sponsoring Entity can then proceed with the proposal while monitoring the project activities, for changes or circumstances during implementation that could affect classification of the proposed mission as a NRP spacecraft. If a NRP spacecraft categorization is determined to be inappropriate, the local EMO will initiate plans for preparation of additional NEPA documentation.

**NASA Routine Payload Checklist**

PROJECT NAME: GOES-R SERIES (R,S,T,U)

DATE OF LAUNCH: 10/2015 GOES-R

PROJECT CONTACT: EDWARD GRIGSBY

PHONE NUMBER: X6-1861

MAILSTOP:410

PROJECT START DATE: 4/2007

PROJECT LOCATION: BLDG 6

PROJECT DESCRIPTION: FOLLOW-ON GOES SATELLITE USED FOR NATIONAL WEATHER SERVICE

<b>A. SAMPLE RETURN:</b>		YES	NO
1. Would the candidate mission return a sample from an extraterrestrial body?			X
<b>B. RADIOACTIVE MATERIALS:</b>		YES	NO
1. Would the candidate spacecraft carry radioactive materials in quantities that produce an A2 mission multiple value of 10 or more?			X
Provide a copy of the Radioactive Materials On Board Report as per NPR 8715.3 with the ERP submittal			
<b>C. LAUNCH AND LAUNCH VEHICLES:</b>		YES	NO
1. Would the candidate spacecraft be launched on a vehicle and launch site combination other than those listed in Table C-1 below?			X
2. Would launch of the proposed mission exceed the approved or permitted annual launch rate for the particular launch vehicle or launch site?			X
Comments:			
<b>D. FACILITIES:</b>		YES	NO
1. Would the candidate mission require the construction of any new facilities or substantial modification of existing facilities?		X	
Provide a brief description of the construction or modification required, including whether ground disturbance and/or excavation would occur:			
- UPGRADES TO ELECTRICAL SYSTEMS, INFRASTRUCTURE, AND ANTENNA SYSTEMS AT WCDAS, WALLOPS, VA (NOAA-EA/FONSI, AUGUST 2011)			
- INSTALLATION OF ANTENNAS AT REMOTE BACK-UP (RBU) FAIRMONT, WVA (NOAA-CATEX, JULY 2010)			
- UPGRADES TO ANTENNA AND POWER AT NOAA SATELLITE OPERATIONS FACILITY (NSOF) SUITLAND, MD (NOAA-CATEX IN PROGRESS)			
<b>E. HEALTH AND SAFETY:</b>		YES	NO
1. Would the candidate spacecraft utilize batteries, ordnance, hazardous propellant, radiofrequency transmitter power, or other subsystem components in quantities or levels exceeding the EPCs in Table C-2 below?			X
2. Would the expected risk of human casualty from spacecraft planned orbital reentry exceed the criteria specified by NASA Standard 8719.14?			X
3. Would the candidate spacecraft utilize any potentially hazardous material as part of a flight system whose type or amount precludes acquisition of the necessary permits prior to its use or is not included within the definition of the Envelope Payload Characteristics?			X
4. Would the candidate mission, under nominal conditions, release material other than propulsion system exhaust or inert gases into the Earth's atmosphere or space?			X
5. Are there changes in the preparation, launch or operation of the candidate spacecraft from the standard practices described in Chapter 3 of this EA?			X
6. Would the candidate spacecraft utilize an Earth-pointing laser system that does not meet the requirements for safe operation (ANSI Z136.1-2007 and ANSI Z136.6-2005)?			X
7. Would the candidate spacecraft contain, by design (e.g., a scientific payload) pathogenic microorganisms (including bacteria, protozoa, and viruses) which can produce disease or toxins hazardous to human health or the environment beyond Biosafety Level 1 (BSL 1) <sup>1</sup> ?			X
Comments:			

<sup>1</sup> The use of biological agents on payloads is limited to materials with a safety rating of "Biosafety Level 1." This classification includes defined and characterized strains of viable microorganisms not known to consistently cause disease in healthy human adults. Personnel working with Biosafety Level 1 agents follow standard microbiological practices including the use of mechanical pipetting devices, no eating drinking, or smoking in the laboratory, and required hand-washing after working with agents or leaving a lab where agents are stored. Personal protective equipment such as gloves and eye protection is also recommended when working with biological agents.

### NASA Routine Payload Checklist

PROJECT NAME: GOES-R SERIES (R,S,T,U) DATE OF LAUNCH: 10/2015 GOES R  
 PROJECT CONTACT: EDWARD GRIGSBY PHONE NUMBER: 6-61861 MAILSTOP: 410  
 PROJECT START DATE: 4/2007 PROJECT LOCATION: BLDG 6  
 PROJECT DESCRIPTION: FOLLOW-ON GOES SATELLITE USED FOR NATIONAL WEATHER SERVICE

F. OTHER ENVIRONMENTAL ISSUES:	YES	NO
1. Would the candidate spacecraft have the potential for substantial effects on the environment outside the United States?		X
2. Would launch and operation of the candidate spacecraft have the potential to create substantial public controversy related to environmental issues?		X
3. Would any aspect of the candidate spacecraft that is not addressed by the EPCs have the potential for substantial effects on the environment (i.e., previously unused materials, configurations or material not included in the checklist)?		X
Comments:		

**Table C-1. Launch Vehicles and Launch Sites**

Launch Vehicle and Launch Vehicle Family	Space Launch Complexes and Pads				
	Eastern Range (CCAFS)	Western Range (VAFB)	USAKA/RTS	WFF	KLC
Athena I, IIc, III <sup>a</sup>	LC-46	CA Spaceport (SLC-8)	N/A	Pad 0	LP-1 <sup>a</sup>
Atlas V Family	LC-41	SLC-3	N/A	N/A	N/A
Delta II Family	LC-17	SLC-2	N/A	N/A	N/A
Delta IV Family	LC-37	SLC-6	N/A	N/A	N/A
Falcon 1/1e	LC-36	SLC-4W	Omelek Island	Pad 0	LP-3 <sup>b</sup>
Falcon 9	LC-40	SLC-4E	Omelek	Pad 0	LP-3 <sup>b</sup>
Minotaur I	LC-20 and/or LC-46	SLC-8	N/A	Pad 0	LP-1
Minotaur II-III	LC-20 and/or LC-46	SLC-8	N/A	Pad 0	LP-1
Minotaur IV	LC-20 and/or LC-46	SLC-8	N/A	Pad 0	LP-1
Minotaur V	LC-20 and/or LC-46	SLC-8	N/A	Pad 0	LP-1
Pegasus XL	CCAFS skidstrip KSC SLF	VAFB Airfield	Kwajalein Island	WFF Airfield	N/A
Taurus	LC-46 and/or LC-20	SLC-576E	N/A	Pad 0	LP-1
Taurus II	NA	NA	N/A	Pad 0	LP-3 <sup>b</sup>
Any other launch vehicle/launch site combination for which NASA has completed or cooperated on the NEPA compliance					

<sup>a</sup>. Athena III and LP-3 are currently under design.

<sup>b</sup> While not explicitly listed in this table, the Minotaur IV includes all configurations of this launch vehicle, including the Minotaur IV+, which is a Minotaur IV with a Star 48V 4<sup>th</sup> stage.

**Key:** CA=California; CCAFS=Cape Canaveral Air Force Station; KSC=Kennedy Space Center; LC=Launch Complex; LP=Launch Pad; MARS=Mid-Atlantic Regional Spaceport; SLC=Space Launch Complex; SLF=Shuttle Landing Facility; USAKA/RTS=United States Army Kwajalein Atoll/Reagan Test Site; VAFB=Vandenberg Air Force Base; WFF=Wallops Flight Facility.



**Table C-2. Summary of Envelope Payload Characteristics by Spacecraft Subsystems**

<b>Structure</b>	<ul style="list-style-type: none"> <li>• Unlimited: aluminum, beryllium, carbon resin composites, magnesium, titanium, and other materials unless specified as limited.</li> </ul>
<b>Propulsion<sup>a</sup></b>	<ul style="list-style-type: none"> <li>• Liquid propellant(s); 3,200 kg (7,055 lb) combined hydrazine, monomethylhydrazine and/or nitrogen tetroxide.</li> <li>• Solid Rocket Motor (SRM) propellant; 3,000 kg (6,614 lb) Ammonium Perchlorate (AP)-based solid propellant (examples of SRM propellant that might be on a spacecraft are a Star-48 kick stage, descent engines, an extra-terrestrial ascent vehicle, etc.)</li> </ul>
<b>Communications</b>	<ul style="list-style-type: none"> <li>• Various 10-100 Watt (RF) transmitters</li> </ul>
<b>Power</b>	<ul style="list-style-type: none"> <li>• Unlimited Solar cells; 5 kilowatt-Hour (kW-hr) Nickel-Hydrogen (NiH<sub>2</sub>) or Lithium ion (Li-ion) battery, 300 Ampere-hour (A-hr) Lithium-Thionyl Chloride (LiSOCl), or 150 A-hr Hydrogen, Nickel-Cadmium (NiCd), or Nickel-hydrogen (Ni-H<sub>2</sub>) battery.</li> </ul>
<b>Science Instruments</b>	<ul style="list-style-type: none"> <li>• 10 kilowatt radar</li> <li>• American National Standards Institute safe lasers (see Section 4.1.2.1)</li> </ul>
<b>Other</b>	<ul style="list-style-type: none"> <li>• U. S. Department of Transportation (DoT) Class 1.4 Electro-Explosive Devices (EEDs) for mechanical systems deployment</li> <li>• Radioactive materials in quantities that produce an A2 mission multiple value of less than 10</li> <li>• Propulsion system exhaust and inert gas venting</li> <li>• Sample returns are considered outside of the scope of this environmental assessment</li> </ul>

<sup>a</sup>. Propellant limits are subject to range safety requirements.

**Key:** kg=kilograms; lb=pounds.

**Goddard Space Flight Center**  
**FLIGHT PROJECT ENVIRONMENTAL CHECKLIST**



1. PROJECT/PROGRAM GOES-R Series (R,S,T,U) NOAA OPERATIONAL WEATHER SATELLITE	Date: 25 Jan 2012
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**2. SCHEDULE**

PDR/CDR: GOES-R MPDR held Aug 2011 : MCDR to be held Sep 2012	Launch Date: Oct 2015
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**3. CURRENT STATUS**

The GOES-R Program is successfully completed MPDR (technical portion) in August 2011 and is currently preparing for Project-level (Flight and Ground) CDR's - scheduled for 2nd QTR FY2012. Flight Project Instruments are in fabrication. Mission Level CDR will occur in 4th QTR 2012. LRD is October 2015  
GOES-S launch is scheduled for 2017 and GOES T and U are TBD.

**4. PROJECT DESCRIPTION**

a. Purpose:  
To provide continuous weather imagery and monitoring of meteorological data for the United States, Latin America, much of Canada and most of the Atlantic and Pacific ocean basins. GOES-R Series will provide critical atmospheric, oceanic, climatic, and solar products supporting weather forecasting and warnings.

b. Spacecraft:  
Developed by Lockheed Martin as a variant of the A-2100 bus.

c. Instruments:  
ABI, GLM, SUVI, EXIS, SEISS, MAG; All passive.

d. Launch Vehicle:  
Atlas 541

e. Launch Site:  
Eastern Test Range, SLC 41

f. NASAs Involvement/Responsibility:  
NASA provides GSFC management oversight/ facilities, observatory development, Launch vehicle, LEO processing and development personnel.

g. Participants/Locations:  
GOES-R Project at GSFC, ETR and WCDAS.

h. End-of-Mission Plan: Planned Re-entry (controlled/uncontrolled?)  
EOL boost into super-synchronous orbit.  
  
No planned re-entry.

5. Is there anything controversial or unique about the mission, spacecraft or instruments? If yes, Explain.    Yes     No

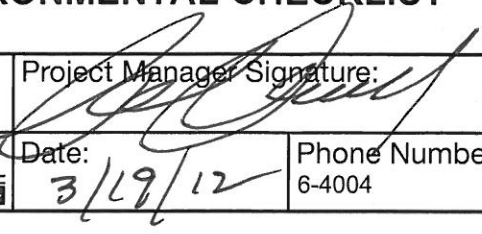
6. Is the mission compliant with NASA requirements for limiting orbital debris (NPR 8715.6, and NASA Standard 8719.14? Explain non-compliances.    Yes     No

7. During any phase, does the mission/project include or involve: Check yes for all that apply. If uncertain, check the corresponding box. For all that apply, provide an explanation. Use the additional space below if needed.			
	Yes	No	Uncertain
A. Fuels	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Ionizing Radiation Devices/Sources	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. Explosives	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
D. Hazardous Materials/Substances/Chemicals	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
E. Lasers (Class, Earth Pointing)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. Disease Producing Pathogenic Microorganisms/Biological Agents	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
G. Discharges/Venting of any Substances into Air, Water, or Soil	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
H. Hazardous Waste Generation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
I. High Noise Levels	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
J. Sample Return to Earth	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
K. Radio Frequency Communications	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
L. Construction/Modification/Demolition of a Facility/Lab (onsite - offsite)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
M. Land Disturbance, Tree Clearing, Removal of Vegetation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
N. Impact on Threatened or Endangered Species	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
O. Impact/Destruction of Sensitive Wildlife Habitat	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
P. Impact on/near Areas of Cultural Significance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Q. Impact on Local Social or Economic Conditions (Increase in Traffic, Employment, etc.)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
R. Impact on Minority or Low Income Populations	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
S. New or Foreign Launch Vehicle	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
T. Other Issues of Potential Environmental Impact	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
U. Environmental Permits	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Additional Information A. Fuels:MMH (1450 kg) and NTO (820 kg) C. Explosives: Pyro-valves, separation and deployment pyrotechnics D. Hazardous Materials: Li-Ion batteries K. RF: S, L and X-band for communications L. Upgrades to electrical systems, infrastructure, and antenna systems at WCDAS, Wallops, VA (NOAA-EA/FONSI, August 2011) Installation of antennas at Remote Back-Up (RBU) Fairmont, WVA (NOAA-CATEX, July 2010) Upgrades to antenna and power at NOAA Satellite Operations Facility (NSOF) Suitland, MD (NOAA-CATEX in progress)			
8. What Safety hazards are associated with the mission?			
Fuel and pyros			
9. Summary of Subsystem Components			
Propulsion (Include fuel type, amount, tank size, materials, dimensions)	Propellant load is 1450 kg hydrazine per MIL-PRF-26536E in one Ti tank and 820 kg Mixed Oxides of Nitrogen (MON-3, nitrogen tetroxide) per MIL-PRF-26539E evenly split between two Ti tanks.		
Communications	Various transmitters; less than 100 W RF output; S, L and X-band for comm-links		
Structural Materials	Aluminum, magnesium, titanium, carbon resin composites. Less than 50kg beryllium.		
Power	Solar array of less than 5 kW (4728 watt EOL, 156 strings of 42 cells each), and less than 100kg of Li-Ion batteries		
Science Instruments	Advanced Baseline Imager(ABI), GOES Lightning Mapper(GLM), Space Environment In-Situ Suite (SEISS), Solar UV Imager (SUVI),Extreme Ultraviolet and X-Ray Irradiance Sensors (EXIS), Magnetometer		
Hazardous Components (radioactive materials, lasers, chemicals, etc.)	Hydrazine, NTO, and pyrotechnic devices. Two (2) Li-ion batteries each contain 36 cells, each cell has mass of 1.15 kg contained within an aluminum case lithium nickel dioxide, cobalt dioxi		
Other (include dimensions and weight of s/c)	Max size of X dimension 3.86 m, Y dimension 2.68 m, Z dimension 5.97 m, and 2647.7 kg predicted dry mass.		

**Goddard Space Flight Center**  
**FLIGHT PROJECT ENVIRONMENTAL CHECKLIST**

Project Manager Printed Name:  
Mike Donnelly

Project Manager Signature:



Project Name:  
GOES-R Series (R,S,T) NOAA OPERATIONAL WEATHER SATELLITE

Date:  
3/19/12

Phone Number:  
6-4004

Org. Code:  
417

Comments: