National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, MD 20771

Reply to Attn of 460

MEMORANDUM FOR THE RECORD

The National Environmental Policy Act (NEPA) Compliance for Solar Orbiter (SO) Collaboration

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 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: *EA for Launch of NASA Routine Payloads (Final)*, November 2011). The 2011 NASA Routine Payload Environmental Assessment (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), Vandenberg Air Force Base (VAFB), the United States Army Kwajalein Atoll/Reagan Test Site (USAKA/RTS), NASA's Wallops Flight Facility (WFF), and the Kodiak Launch Complex (KLC).

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 CCAFS, VAFB, 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

SO is a collaborative mission between the NASA and the European Space Agency (ESA) to study the Sun with advanced instrumentation from an inner-solar system vantage point, and provide images and measurements in unprecedented resolution and detail. By approaching as close as 62 solar radii, SO will view the solar atmosphere with high spatial resolution and combine this with measurements made in-situ. By the end of the nominal mission SO will deliver images and data from higher heliolatitudes than have been possible in the past. SO will coordinate its scientific mission with NASA's Solar Probe Plus to maximize their combined science return.

The purpose of the mission is to explore the near-Sun environment to improve the understanding of how the Sun determines the environment of the inner solar system, how it generates the heliosphere itself, and how fundamental plasma physical processes operate near the Sun. Four primary science objectives for the SO mission are as follows:

- How and where do the solar wind plasma and magnetic field originate in the corona?
- How do solar transients drive heliospheric variability?
- How do solar eruptions produce energetic particle radiation that fills the heliosphere?
- How does the solar dynamo work and drive connections between the Sun and the heliosphere?

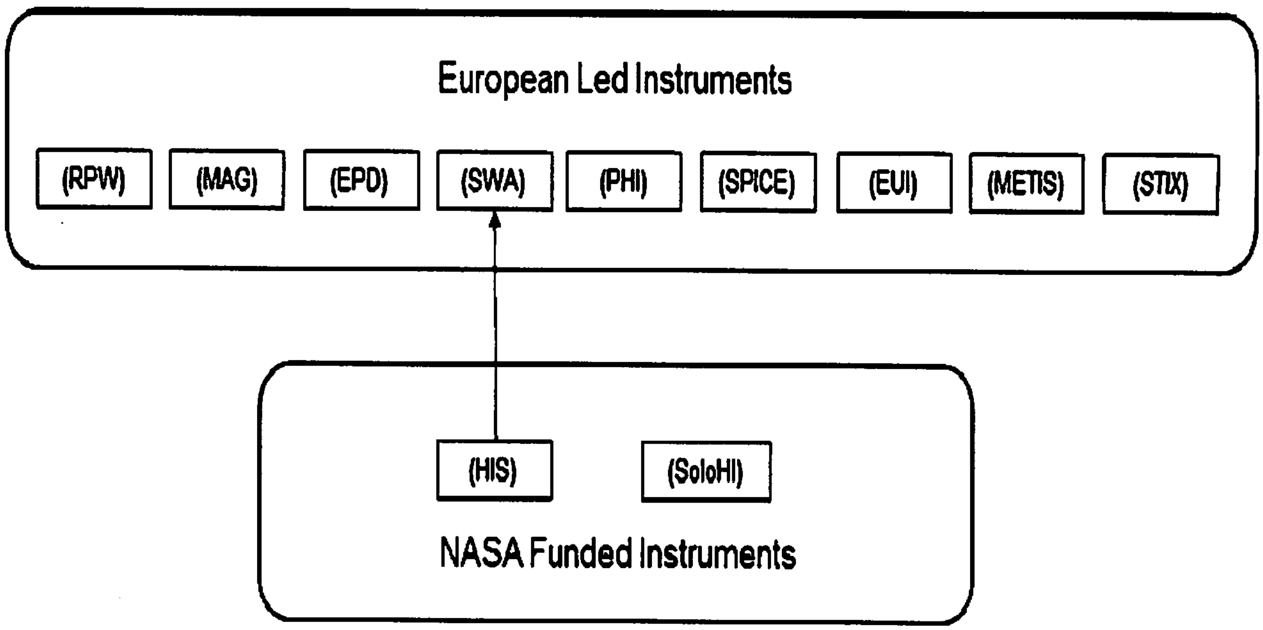
SO is a three-axis stabilized spacecraft equipped with instruments for both in-situ measurements and remote-sensing observations. It will be placed into an elliptical orbit about the Sun with perihelia ranging from 0.28 to 0.38 Astronomical Unit (AU) and aphelia from 0.73 to 0.92 AU. After an in-ecliptic phase of perihelion passes where it is nearly corotating with the Sun, SO will use multiple Venus gravity assist maneuvers to raise the inclination of its orbit to progressively higher heliolatitudes, reaching 27.5 degrees by the end of the nominal seven-year prime mission phase and about 34 degrees by the end of the three-year extended mission.

ESA has overall responsibility for providing the spacecraft bus, integration of the instruments onto the bus, mission operations, ground operations, and overall science operations. Nine of the 11 science instruments are being provided by European Member States.

NASA has responsibility for providing two instruments, one for in-situ measurements Heavy Ion Sensor (HIS) and one for remote-sensing observations Solar Orbitor Heliosperic Imager (SoloHI). NASA is also responsible for providing the launch vehicle and launch service.

SO is scheduled to be launched from CCAFS in early 2017. Launch vehicle selection has not been made, but will be one of the launch vehicle/launch site combinations addressed in the 2011 NRPEA. Launch vehicle candidates include Atlas V and Falcon 9.

A summary of the science instruments is provided below.



In-situ Instrumentation:

- Radio and Plasma Waves (RPW), led by *Laboratory Studies of Space and Astrophysics Instrumentation,* France
- Magnetometer(MAG), led by the *Imperial College London*, UK

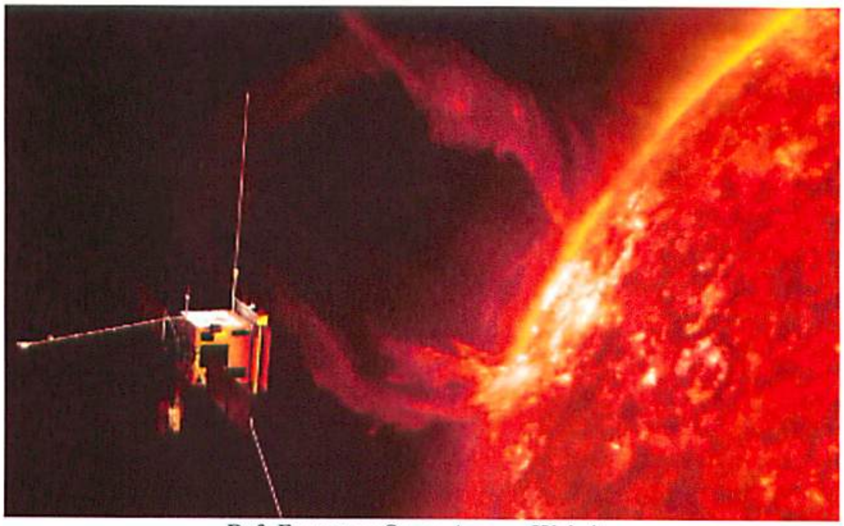
Particle Package:

- Energetic Particle Detector (EPD) led by the *University of Alcala*, Spain
- Solar Wind Analyzer (SWA), led by *Mullard Space Science Laboratory,* UK
- HIS* - becomes part of SWA, led by *Southwest Research Institute*, USA

Solar remote sensing instrumentation:

- Visible Imager and Magnetograph (PHI) led by *Max-Planck-Institute for Solar System Research,* Germany
- Spectral Imaging of the Coronal Environment (SPICE), led by *Rutherford-Appleton Laboratory*, UK
- EUV Imager (EUI), *led by Centre Spatial de Liège*, Belgium
- Multi Element Telescope for Imaging and Spectroscopy/Coronagraph (METIS), led by *INAF- Astronomical Observatory of Turin,* Italy
- Spectrometer Telescope Imaging X-Ray (STIX), led by the *University of Applied Sciences in Northern Switzerland*, Switzerland
- SoloHI*, led by *US Naval Research Laboratory* USA

***** ***Funded by NASA***



Ref: European Space Agency Website
http://sci.esa.int/science-e/www/object/index.cfm?fobjectid=50294

3.0 NASA Routine Payload Determination

SO has been evaluated against the 2011 NRPEA, using the RPC (see enclosed Evaluation Recommendation Package). The components utilized in the SO Observatory are made of materials normally encountered in the space industry. The mission will not utilize an earth pointing laser, will not carry any pathogenic organisms and will not return samples to Earth. The mission will carry a small amount of radioactive material in the STIX instrument as an on-board calibration source. Launch approval for this source is at the Nuclear Flight Safety Assurance Manager level. There is no planned re-entry for the SO Observatory.

The site specific impacts of the potential launch vehicle/launch site combination are addressed in the EA. Based on the analyses set forth in the 2011 NRPEA, NASA has determined that the environmental impacts associated with the launch of SO observatory will not individually or cumulatively have a significant impact on the quality of the human environment and that a routine payload classification is applicable. This determination only applies to actions under NASA control and management authority not to ESA actions.

George W. Morrow
Director of Flight Projects

6/14/13
Date

C J Scolese

Christopher J. Scolese
Director

7/8/2013
Date

Enclosure

cc:
100/R. Obenschain
250/B. Montgomery
400/D. Scheve
400/S. Shinn
460/N. Chrissotimos
460/H. Maldonado

EVALUATION RECOMMENDATION PACKAGE

Record of Environmental Consideration
Routine Payload Checklist
NEPA Environmental Checklist

Enclosure

RECORD OF ENVIRONMENTAL CONSIDERATION

1. Project Name: Solar Orbiter

2. Description/location of proposed action: Solar Orbiter is a joint ESA/NASA mission to study the sun using a solar-orbiting observatory. NASA is responsible for providing two (2) of the science instruments and the launch service. The launch will be from Cape Canaveral Air Force Station (CCAFS).

   Date and/or Duration of project: Launch – January 2017

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 — Date: 5/3/2013

Haydee Maldonado
Haydee Maldonado Project Manager, Code 460 — Date: 5/3/2013

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: Solar Orbiter		Date of Launch: January 2017
Project Contact: Haydee Maldonado	Phone Number: (301) 286-6762	Mailstop: Code 460 / Bldg 22
Project Start Date: July 01, 2009 (Phase A)	Project Location: Goddard Space Flight Center / Kennedy Space Center	

Project Description:
Solar Orbiter is a joint ESA / NASA mission to study the sun using a solar-orbiting observatory. NASA is responsible for providing two (2) of the science instruments and the launch service. The launch will be from Cape Canaveral Air Force Station in Florida.

A. Sample Return:	Yes	No
1. Would the candidate mission return a sample from an extraterrestrial body?	☐	☑

B. Radioactive Materials:	Yes	No
1. Would the candidate spacecraft carry radioactive materials in quantities that produce an A2 mission multiple value of 10 or more?	☐	☑

Provide a copy of the Radioactive Materials On Board Report as per NPR 8715.3 with the ERP submittal.

C. Launch and Launch Vehicles:	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?	☐	☑
2. Would the proposed mission exceed the approved or permitted annual launch rate for the particular launch vehicle or launch site?	☐	☑

Comments:
Solar Orbiter will be launched from CCAFS on board an Atlas V or Falcon 9 launch vehicle under the provisions of the NLS-II contract.

D. Facilities:	Yes	No
1. Would the candidate mission require the construction of any new facilities or substantial modification of existing facilities?	☐	☑

Provide a brief description of the construction or modification required, including whether ground disturbance and/or excavation would occur.
Not applicable. No facility or site modifications required.

E. Health and Safety:	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 EPC's in Table C-2 below?	☐	☑
2. Would the expected risk of human casualty from spacecraft planned orbital reentry exceed the criteria specified by NASA Standard 8719.14?	☐	☑
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?	☐	☑
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?	☐	☑
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?	☐	☑
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)?	☐	☑
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)[1]?	☐	☑

Comments:

Continued on next page

[1] The use of biological agents on payloads is limited to materials with a safety rating of "Biosafety Level 1." This classification includes defined an 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: Solar Orbiter		Date of Launch: January 2017
Project Contact: Haydee Maldonado	Phone Number: (301) 286-6762	Mailstop: Code 460 / Bldg 22
Project Start Date: July 01, 2009 (Phase A)	Project Location: Goddard Space Flight Center / Kennedy Space Center	

Project Description:
Solar Orbiter is a joint ESA / NASA mission to study the sun using a solar-orbiting observatory. NASA is responsible for providing two (2) of the science instruments and the launch service. The launch will be from Cape Canaveral Air Force Station in Florida.

F. Other Environmental Issues:	Yes	No
1. Would the candidate spacecraft have the potential for substantial effects on the environment outside the United States?	☐	☑
2. Would launch and operation of the candidate spacecraft have the potential to create substantial public controversy related to environmental issues?	☐	☑
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)?	☐	☑

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[a]	LC-46	CA Spaceport (SLC-8)	NA	Pad 0	LP-1[a]
Atlas V Family	LC-41	SLC-3	NA	NA	NA
Delta II Family	LC-17	SLC-2	NA	NA	NA
Delta IV Family	LC-37	SLC-6	NA	NA	NA
Falcon I/Ie	LC-36	SLC-4W	Omelek Island	Pad 0	LP-3[b]
Falcon 9	LC-40	SLC-4E	Omelek	Pad 0	LP-1
Minotaur I	LC-20 and/or LC-46	SLC-8	NA	Pad 0	LP-1
Minotaur II-III	LC-20 and/or LC-46	SLC-8	NA	Pad 0	LP-1
Minotaur IV[c]	LC-20 and/or LC-46	SLC-8	NA	Pad 0	LP-1
Minotaur V	LC-20 and/or LC-46	SLC-8	NA	Pad 0	NA
Pegasus XL	CCAFS skidstrip KSC SLF	VAFB Airfield	Kwajalein Island	WFF Airfield	NA
Taurus	LC-20 and/or LC-46	SLC-576E	NA	Pad 0	LP-1
Taurus II	NA	NA	NA	Pad 0	LP-3[b]
Any other launch vehicle/launch site combination for which NASA has completed or cooperated on the NEPA compliance.					

[a] Athena III is currently under design.

[b] LP-3 is currently under design.

[c] 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 4th 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.

NASA ROUTINE PAYLOAD CHECKLIST

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

Structure	• Unlimited: aluminum, beryllium, carbon resin composites, magnesium, titanium, and other materials unless specified as limited.
Propulsion[a]	• Liquid propellant(s); 3,200 kg (7,055 lb) combined hydrazine, monomethyhydrazine and/or nitrogen tetroxide. • 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.)
Communications	• Various 10-100 Watt (RF) transmitters
Power	• Unlimited Solar cells; 5 kilowatt-Hour (kW-hr) Nickel-Hydrogen (NiH_2) 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_2) battery.
Science Instruments	• 10 kilowatt radar • American National Standards Institute safe lasers (see Section 4.1.2.1)
Other	• U. S. Department of Transportation (DoT) Class 1.4 Electro-Explosive Devices (EEDs) for mechanical systems deployment • Radioactive materials in quantities that produce an A2 mission multiple value of less than 10 • Propulsion system exhaust and inert gas venting • Sample returns are considered outside of the scope of this environmental assessment

[a] Propellant limits are subject to range safety requirements.

Key: kg=kilograms; lb=pounds.

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FLIGHT PROJECT ENVIRONMENTAL CHECKLIST

1. PROJECT/PROGRAM	Date:
Solar Orbiter Collaboration	October 23, 2012

2. SCHEDULE

PDR/CDR:	Launch Date:
KDP-B completed Dec 2011, KDP-C scheduled for Dec 2012	January 2017 (prime) / August 2018 (back-up)

3. CURRENT STATUS

The two (2) NASA-provided instruments/sensors will complete PDR in the Fall of CY2012 (SoloHI in August and HIS in November). The KDP-C review for the NASA-contributions to the Solar Orbiter Project is scheduled for December 2012. The ESA Solar Orbiter Project started its Systems PDR process in December 2011 and the Systems CDR is scheduled to complete in November 2013.

4. PROJECT DESCRIPTION

a. Purpose:

Solar-orbiting, heliophysics mission

b. Spacecraft:

3-axis stabilized platform with bi-propellant propulsion system designed and manufactured by Astrium, Ltd. Spacecraft design shares significant heritage with the ESA BepiColombo project.

c. Instruments:

Suite of 10 passive in-situ and remote sensing instruments (9 from ESA and 1 instrument/1 sensor from NASA)

d. Launch Vehicle:

NASA-provided EELV-class launch vehicle with 4-meter payload fairing. Launch service to be procured under the NLS-II contract by KSC/LSP. Launch vehicle candidates include Atlas V and Falcon 9

e. Launch Site:

Cape Canaveral Air Force Station, Florida

f. NASAs Involvement/Responsibility:

Launch services (from CCAFS), One (1) instrument (SoloHI), and one (1) sensor (HIS)

g. Participants/Locations:

NASA (GSFC & KSC), SWRI (San Antonio), NRL, and ESA (ESTEC)

h. End-of-Mission Plan: Planned Re-entry (controlled/uncontrolled?)

Earth-escape mission with no return / no re-entry

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

Not applicable

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 ☐

The NASA contributions to the Solar Orbiter Project will be fully compliant with NASA Orbital Debris requirements. ESA has responsibility for ensuring mission-level compliance of the Solar Orbiter Observatory.

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	☑	☐	☐
B. Ionizing Radiation Devices/Sources	☑	☐	☐
C. Explosives	☑	☐	☐
D. Hazardous Materials/Substances/Chemicals	☑	☐	☐
E. Lasers (Class, Earth Pointing)	☐	☑	☐
F. Disease Producing Pathogenic Microorganisms/Biological Agents	☐	☑	☐
G. Discharges/Venting of any Substances into Air, Water, or Soil	☐	☑	☐
H. Hazardous Waste Generation	☑	☐	☐
I. High Noise Levels	☐	☑	☐
J. Sample Return to Earth	☐	☑	☐
K. Radio Frequency Communications	☑	☐	☐
L. Construction/Modification/Demolition of a Facility/Lab (onsite - offsite)	☐	☑	☐
M. Land Disturbance, Tree Clearing, Removal of Vegetation	☐	☑	☐
N. Impact on Threatened or Endangered Species	☐	☑	☐
O. Impact/Destruction of Sensitive Wildlife Habitat	☐	☑	☐
P. Impact on/near Areas of Cultural Significance	☐	☑	☐
Q. Impact on Local Social or Economic Conditions (increase in Traffic, Employment, etc.)	☐	☑	☐
R. Impact on Minority or Low Income Populations	☐	☑	☐
S. New or Foreign Launch Vehicle	☐	☑	☐
T. Other Issues of Potential Environmental Impact	☐	☑	☐
U. Environmental Permits	☐	☑	☐

Additional Information

A. Fuels: Maximum capacity of 208 kilograms of bi-propellant (83.1 kg of monomethyl-hydrazine and 124.5 kg of MON-3);
B. Ionizing Radiation Sources: 100 Bq of Ba133 in the STIX instrument as an on-board calibration source;
C. Explosives: NSIs for release of deployable mechanisms (solar arrays, instrument boom, high-gain antenna) and propulsion system latch valves;
D. Hazardous Materials, Substances, and Chemicals: standard cleaning materials, paints and adhesives during launch site processing;
H. Hazardous Wastes: residual products associated with launch site processing (see A and D above);
K. Radio Frequency Communications: X and Ka-band 35 watt traveling wave tube amplifiers (TWTAs)

8. What Safety hazards are associated with the mission?

The Solar Orbiter Observatory has no usual hazards associated with the preparation or launch of the mission. The launch campaign activities at Cape Canaveral AFS will involve propellant loading operations and RF subsystem testing in support of Observatory processing.

9. Summary of Subsystem Components

Propulsion (include fuel type, amount, tank size, materials, dimensions	Bi-propellant, helium self-regularted propulsion system utilizing monomethylhdrazine and nitrogen tetroxide (MON-3) (one 124 liter, Titanium propellant tank for each commodity) and a separate helium pressurant tank (Composite Over-wrapped Vessel construction). 18 reaction control thrusters configured in two redundant strings of nine each.
Communications	X-band uplink and downlink. Redundant set of X-Band transponders and 70-watt X-Band traveling wave tube amplifiers. Primary communication is via a 1.1 meter, steerable High Gain Antenna. Output power at the antenna is 55 watts.
Structural Materials	Composite central structural cylinder with aluminum and aluminum/composite honeycomb structural panels form the spacecraft primary structure. The spacecraft also has a large composite heat shield that is a fixed (non-deployable) feature of the design.
Power	Electrical Power Subsystem consists of two solar array wings, a power conditioning and distribution unit, and a 2592 Wh Lithium Ion battery.
Science Instruments	Suite of 10 passive in-situ and remote sensing instruments (eight from ESA and two from NASA)
Hazardous Components (radioactive materials, lasers, chemicals, etc.)	Propellants and chemicals (as detailed under "Additional Information" above), Ba133 calibration source on the STIX instrument (100 Bq)
Other (include dimensions and weight of s/c)	Spacecraft separated launch mass (wet): <1,800 kg; Spacecraft dimensions: 2.5m x 3.0m x 2.5m

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FLIGHT PROJECT ENVIRONMENTAL CHECKLIST

Project Manager Printed Name: Haydee M. Maldonado HAYDEE M. MALDONADO		Project Manager Signature:	
Project Name: Solar Orbiter Collaboration	Date: 10/23/2012	Phone Number: 301-286-6762	Org. Code: 460

Comments:

Note: RPC review included all instruments in the Observatory (European + NASA)

MINOR RADIOACTIVE SOURCES BEING LAUNCHED ON GSFC SPONSORED PROJECTS

Vehicle/ Spacecraft	Planned Launch Date (Mo/Yr)	Launch Site	Number of Sources	Isotope	Total Activity (Curies)	A_2 Limit for Isotope (Ci)	A_2 Multiple for Isotope	Remarks/Disposition
	01/17	CCAFS	1	Ba-133	2.70E-09	8.00E+01	3.38E-11	Mounted inside the Spectrometer/Telescope for Imaging X-Rays (STIX)
						Mission Multiple →	**3.38E-11**	

Nuclear Launch Safety Approval Summary (Table 6.1, NPG 8715.3B, Chapter 6)					
A2 Mission Multiple	**Launch Reported to NFSAM**	**Launch Concurrence/ Approval by**	**Launch Reported to OSTP**	**Required Level of Review and Reports**	**Approval/ Concurrence**
Less than 0.001	Yes	NFSAM	no	Paragraph 6.3.3 Report	Concurrence letter from NFSAM