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

October 31, 2007

Reply to Attn of: 431

MEMORANDUM FOR THE RECORD

National Environmental Policy Act (NEPA) Compliance for Lunar Reconnaissance Orbiter (LRO)

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 (ELVs) from Cape Canaveral Air Force Station (CCAFS) and Vandenberg Air Force Base (VAFB) (Ref: *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*, June 2002). The EA assesses the environmental impacts of missions launched from CCAFS and VAFB with spacecraft that are considered routine payloads.

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

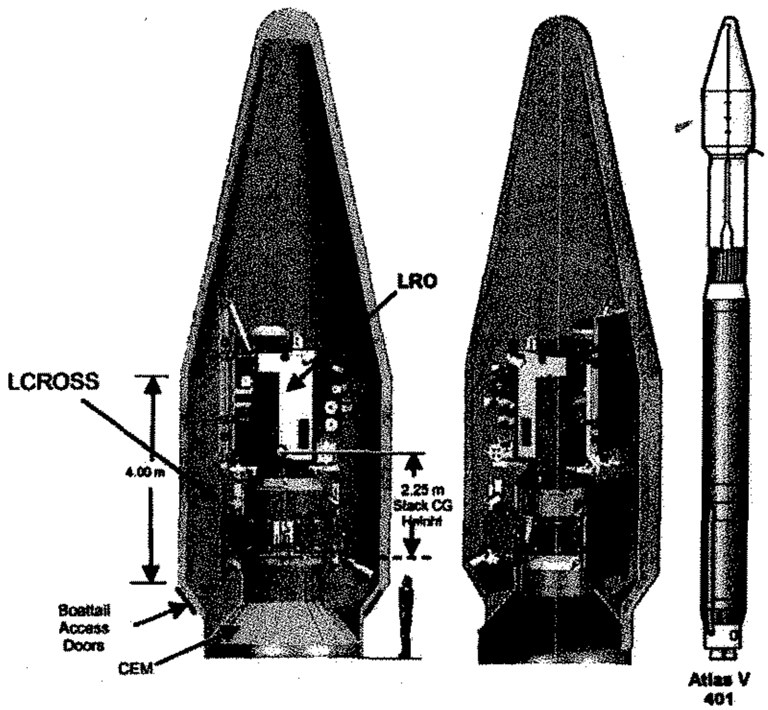
To determine the applicability of a routine payload classification for a mission launched from VAFB and CCAFS and coverage under the NASA routine payload EA, the mission is evaluated against the criteria defined in the EA using the Routine Payload Checklist (RPC).

2.0 Mission Description

The Lunar Precursor and Robotic Program (LPRP) is located at the Marshall Space Flight Center (MSFC). It is responsible for a series of robotic missions to the moon which will prepare for and support future exploration activities to enable sustained human and robotic exploration of Mars and more distant destinations in the solar system.

The Lunar Reconnaissance Orbiter (LRO) is the first of the Robotic Lunar Exploration (RLE) missions, planned for launch by late Fall 2008. LRO will fly within 31 miles (50 kilometers) of the lunar surface for at least one year in order to conduct a comprehensive and detailed mapping mission. The mission is also carrying a secondary payload called Lunar Crater Observation and Sensing Satellite (LCROSS). Its goals are to confirm the presence and nature of water ice at the moon's South Pole. NASA's Goddard Space Flight Center in Greenbelt, MD, manages the orbiter project, and the Agency's Ames Research Center in Moffett Field, CA, manages LCROSS.

The spacecraft are scheduled for launch aboard an Atlas V 401 rocket from Complex 41 at Cape Canaveral Air Force Station during a launch window that opens on Oct. 28, 2008.



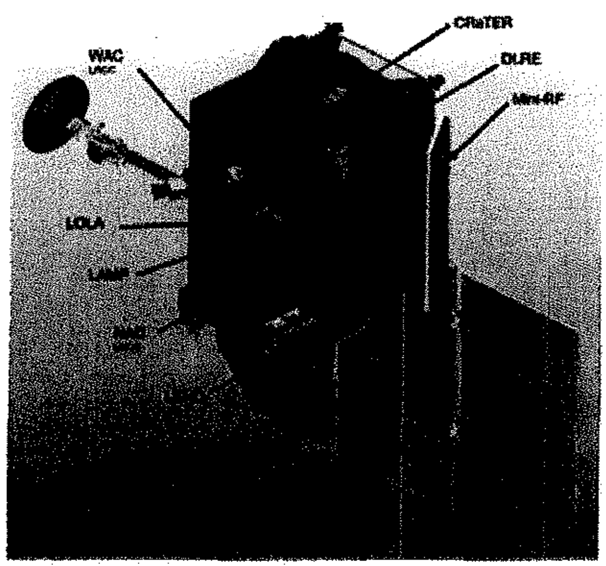
The LRO Mission

The LRO mission emphasizes the overall objective of obtaining data that will facilitate returning men safely to the moon where testing and preparations for an eventual manned mission to Mars will be undertaken.

The LRO mission will not only enable future human exploration but also provide excellent opportunities for future science missions. LRO will spend at least one year in low polar orbit around the moon, collecting detailed information about the Lunar environment. The LRO baseline mission is nominally 1 Earth year at 50 +/- 15 km circular, polar orbit. This may be followed by an extended mission of up to three years in a low maintenance orbit that allows continued observations.

LRO will employ six individual instruments to produce accurate maps and high-resolution images of future landing sites, to assess potential lunar resources, and to characterize the radiation environment. LRO will also test the feasibility of one advanced technology demonstration package. The instruments are provided by various organizations throughout the United States, and one is from Russia. LRO's instrument suite will provide the highest resolution data, and the most comprehensive data set ever returned from the moon. Some of the data includes:

- Supply information on Lunar radiation environment.
- Evaluating the biological impacts and allowing development of protective technologies.
- Provide the first highly accurate 3D lunar cartographic maps
- Map mineralogy across the whole moon
- Search for polar volatiles (especially water ice)
- Provide sub-meter resolution imaging
- Provide an assessment of features for landing sites



The seven payloads are:

- Lunar Orbiter Laser Altimeter (LOLA) which will determine the global topography of the lunar surface at high resolution, measure landing site slopes, surface roughness, and search for possible polar surface ice in shadowed regions.
- Lunar Reconnaissance Orbiter Camera (LROC) which will acquire targeted narrow angle images of the lunar surface capable of resolving meter-scale features to support landing site selection, as well as wide-angle images to characterize polar illumination conditions and to identify potential resources.

- Lunar Exploration Neutron Detector (LEND) which will map the flux of neutrons from the lunar surface to search for evidence of water ice, and will provide space radiation environment measurements that may be useful for future human exploration.
- Diviner Lunar Radiometer Experiment (DLRE) which will chart the temperature of the entire lunar surface at approximately 300 meter horizontal resolution to identify cold-traps and potential ice deposits.
- Lyman-Alpha Mapping Project (LAMP) which will map the entire lunar surface in the far ultraviolet. LAMP will search for surface ice and frost in the polar regions and provide images of permanently shadowed regions illuminated only by starlight.
- Cosmic Ray Telescope for the Effects of Radiation (CRaTER), which will investigate the effect of galactic cosmic rays on tissue-equivalent plastics as a constraint on models of biological response to background space radiation.
- The mini-RF is a technology demonstration of an advanced single aperture radar (SAR) capable of measurements in X-band and S-band. Mini-RF will demonstrate new lightweight SAR, communication technologies and locate potential water-ice.

The LRO spacecraft will be a 3-axis stabilized platform with both stored data and real-time downlink capabilities. The current estimate for the downlink data rate is 100 Mbps with delivery of up to 900Gb/day of observation data to earth.

Four reaction wheels will provide attitude control to 60 arc sec and momentum storage of up to two weeks, with thrusters providing momentum dumping once per month. Two star trackers and an inertial reference unit will provide attitude knowledge of 30 arc sec. Coarse sun sensors provide attitude information in contingency modes, to enable and maintain proper attitude with respect to the sun, keeping the spacecraft power positive and thermally stable.

A 10.7 square meter solar array will provide 1850 W end-of-life during the sunlit portion of the orbit. An 80 A-hr lithium-ion battery will maintain the bus voltage and provide operational power during the orbit eclipses and survival power during the rare, long eclipses of the sun by the earth. The power electronics will distribute the raw 28 ±7 V to the instruments and the spacecraft bus electronics, delivering over 800 W average power each orbit.

The flight computer is a RAD-750 processor executing at 133 MHz. A 385 Gbit memory will store science data for playback to the earth at 100 Mbps through a 40 W Ka-band transmitter and high-gain antenna. An S-band system will provide command, engineering telemetry, and navigation functions. Laser ranging capability will provide 10 cm position precision during four one-hour passes per day. This data, when combined with lunar measurements from LOLA, will improve the orbit determination capability of LRO.

The structure is mostly aluminum and aluminum honeycomb, with graphite-composite face sheets on the instrument module panel. The thermal control system will utilize ammonia-filled heat pipes to spread heat and move it to the zenith-facing radiators. The total mass of the observatory is less than 949 kg dry and 1846 kg fully fueled.

The propulsion system has been designed to provide mid-course transit corrections after separation from the launch vehicle, lunar orbit capture, and station keeping for the remainder of the mission. The propulsion system is a monopropellant hydrazine system. Fuel load is 894 kg of hydrazine (~ 1300 m/sec delta-V capability) in two identical 28,144 in^3 titanium diaphragm propellant tanks (40 in OD oblate spheroid TDRSS type tanks in TDRSS configuration). The system includes twelve dual coil catalytic hydrazine thrusters, four of which are on-axis 80 Newton class insertion thrusters located around the spacecraft center of gravity (in the x-axis). Eight canted 20 Newton class attitude control thrusters provide attitude control, lunar orbit maintenance maneuvers, and momentum dumping.

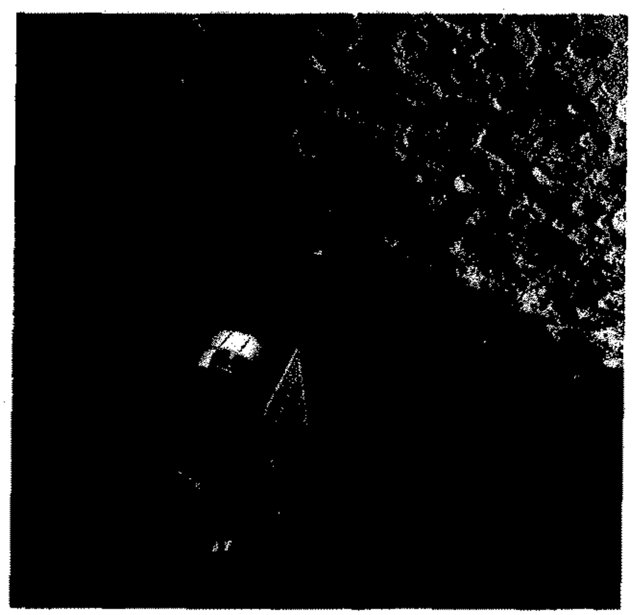
The LCROSS Mission

LCROSS, the smaller secondary payload spacecraft, and the Lunar Reconnaissance Orbiter (LRO) satellite will separately be placed into lunar orbits by the same Atlas-Centaur rocket. NASA's Ames Research Center will oversee the development of the LCROSS mission with its spacecraft development and integration partner, Northrop Grumman.

The LCROSS mission will seek to determine if there is water present in a permanently shadowed crater of a lunar south pole. If there are substantial amounts of water ice there that could be harvested, it could serve the needs as a basic resource for lunar colonization.

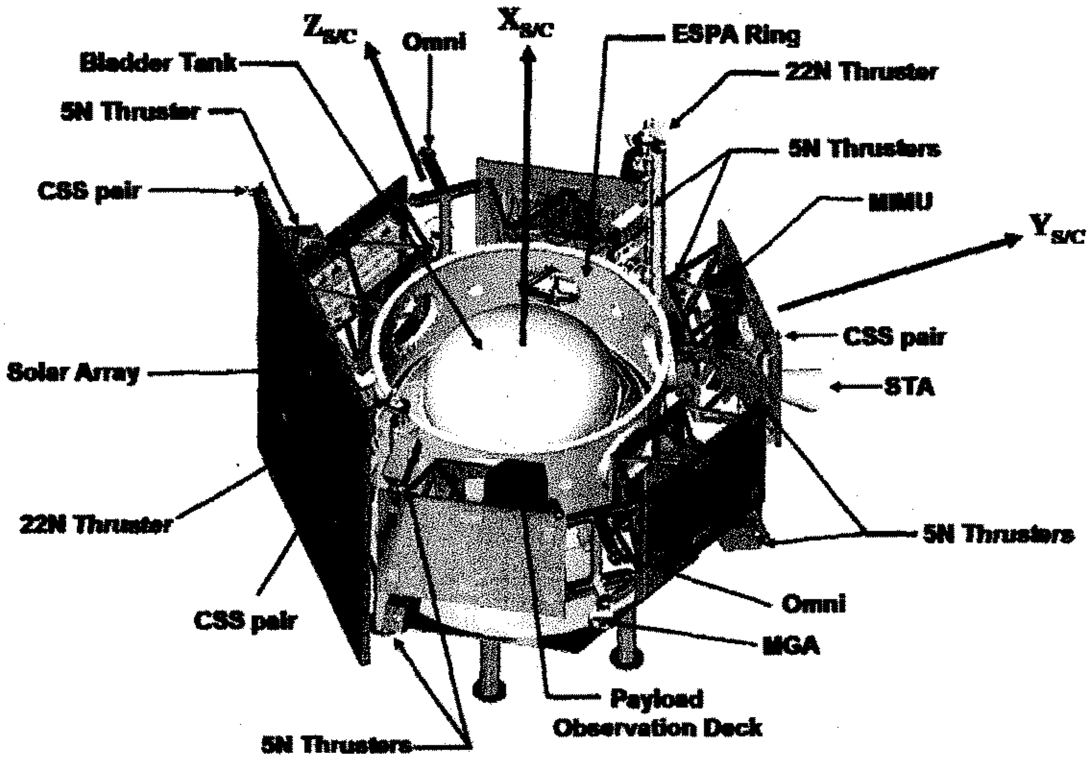
After launch, the LCROSS spacecraft will be injected into a trans-lunar orbit independent of the LRO satellite. On the way to the moon, the LCROSS spacecraft's two main parts, the Shepherding Spacecraft (S-S/C) and the launch vehicle's spent Centaur Upper Stage will remain coupled.

LCROSS will use the Centaur upper stage as a kinetic impactor. As the spacecraft approaches the moon's south pole, the Centaur will separate, and then will impact a crater in a polar region of the moon. A plume from the Centaur crash will develop as the Shepherding Spacecraft heads in towards the moon. The Shepherding Spacecraft will fly through the plume, and instruments on the spacecraft will analyze the debris to look for signs of water and other compounds. Additional space and earth-based instruments also will study the huge plume, which scientists expect to be larger than 200 metric tons. Then the Shepherding Spacecraft itself will become an impactor, creating a second plume visible to lunar-orbiting spacecraft and earth-based observatories.



The S-S/C is an extremely simple spacecraft. The payload consists of 9 instruments: 5 cameras (1 visible, 2 Near IR, 2 Mid IR) and three spectrometers (1 visible, 2 NIR) and one photometer.

The spacecraft components include: an ESPA (EELV Secondary Payload Adaptor) ring that functions as a multifunctional integrating element which supports the LRO adapter; an independent set of avionics; a small 300 kg capacity monopropellant-propulsion system, two 22 Newton delta-v maneuver thrusters, eight 5 newton thrusters for attitude control, a 610W single-panel body mounted solar array and (4) 20 A-hr lithium ion batteries (80A-hr total) for power; mounts for the impact observation instruments; two S-Band omni antennas, and 2 medium-gain horns for telemetry, tracking and command; Star Tracker Assembly (STA), Miniature Inertial Measurement Unit (MIMU), 10 Coarse Sun Sensor Assemblies (CSSA) for the attitude control system (ACS). The entire S-S/C weighs ~600 kg.



3.0 NASA Routine Payload Determination

The components utilized in the LRO and LCROSS spacecrafts are made of materials normally encountered in the space industry. LRO will use a lunar pointing laser and a low level radiation calibration source during integration and test at GSFC. LRO and LCROSS will not carry any pathogenic organisms. The LRO and LCROSS missions will not pose any substantial hazards or environmental concerns.

The LRO and LCROSS missions have been evaluated against the NASA routine payload EA for launches from CCAFS and VAFB, using the RPC (see enclosed Evaluation Recommendation Package). The evaluation indicates that the missions meet the criteria for a routine payload. The missions do not present any unique or unusual circumstances that could result in new or substantial environmental impacts. Based on this review, it is determined that the LRO and LCROSS missions qualify as a routine payload and fall within the scope of the reference routine payload EA. No additional NEPA action or documentation is required.

Edward J. Weiler
Director

Enclosure

EVALUATION RECOMMENDATION PACKAGE

Record of Environmental Consideration
Routine Payload Checklist
NEPA Environmental Checklist

Enclosure

RECORD OF ENVIRONMENTAL CONSIDERATION

1. Project Name: Lunar Reconnaissance Orbiter (LRO) with LCROSS

2. Description/location of proposed action: Mission to explore lunar surface and potential landing sites.

   Date and/or Duration of project: Launch 10/2008

3. It has been determined that the above action:

_X_ a. Is adequately covered in an existing EA or EIS.
Title: *Final Environmental Assessment for Launch of NASA Routine Payloads on ELVs from CCAFS, Florida and VAFB, California*
Date: June 2002

___ 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 (signature) — 9/5/07
Beth Montgomery NEPA Program Manager, Code 250 — Date

(signature) — 9/5/2007
Craig Tooley Project Manager, Code 431 — Date

NASA Routine Payload Checklist

PROJECT NAME: LRO | DATE OF LAUNCH: 15 October 2008

PROJECT CONTACT: Ron Kolecki | PHONE NUMBER: 6-9399 | MAILSTOP: 303

PROJECT START DATE: February 2005 | PROJECT LOCATION: GSFC

PROJECT DESCRIPTION: Lunar Surface Mapping

A. SAMPLE RETURN:	YES	NO
1. Would the candidate mission return a sample from an extraterrestrial body?		x

B. RADIOACTIVE SOURCES:	YES	NO
1. Would the candidate spacecraft carry radioactive materials?		x
2. If yes, would the amount of radioactive sources require launch approval at the NASA Associate Administrator level or higher according to NPG 8715.3 (NASA Safety Manual)?		
Provide a copy of the Radioactive Materials Report as per NPG 8715.3 Section 5.5.2.		

C. LAUNCH AND LAUNCH VEHICLES:	YES	NO
1. Would the candidate spacecraft be launched using a launch vehicle/launch complex combination other than those indicated in Table 1 below?		x
2. Would the proposed mission cause the annual launch rate for a particular launch vehicle to exceed the launch rate approved or permitted for the affected launch site?		x
Comments:		

D. FACILITIES:	YES	NO
1. Would the candidate mission require the construction of any new facilities or substantial modification of existing facilities?		x
2. If yes, has the facility to be modified been listed as eligible or listed as historically significant?		
Provide a brief description of the construction or modification required:		

E. HEALTH AND SAFETY:	YES	NO
1. Would the candidate spacecraft utilize any hazardous propellants, batteries, ordnance, radio frequency transmitter power, or other subsystem components in quantities or levels exceeding the Envelope Payload Characteristics (EPC's) in Table 2 below?		x
2. 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 (EP)?		x
3. Would the candidate mission release material other than propulsion system exhaust or inert gases into the Earth's atmosphere or space?		x
4. Would launch of the candidate spacecraft suggest the potential for any substantial impact on public health and safety?		x
5. Would the candidate spacecraft utilize a laser system that does not meet the requirements for safe operation (ANSI Z136.1-2000 and ANSI Z136.6-2000)? For Class III-B and IV laser operations, provide a copy of the hazard evaluation and written safety precautions (NPG 8715.3).		x
6. Would the candidate spacecraft contain pathogenic microorganisms (including bacteria, protozoa, and viruses) which can produce disease or toxins hazardous to human health?		x
Comments:		

NASA Routine Payload Checklist (continued)

PROJECT NAME: LRO **DATE OF LAUNCH:** 15 October 2008
PROJECT CONTACT: Ron Kolecki **PHONE NUMBER:** 6-9399 **MAILSTOP:** 303
PROJECT START DATE: February 2005 **PROJECT LOCATION:** GSFC
PROJECT DESCRIPTION: Lunar Surface Mapping

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
Comments:		

Table 1: Launch Vehicles and Launch Pads

Launch Vehicle	Eastern Range (CCAFS Launch Complexes)	Western Range (VAFB Space Launch Complexes)
Atlas IIA & AS	LC-36	SLC-3
Atlas IIIA & B	LC-36	SLC-3
Atlas V Family	LC-41	SLC-3
Delta II Family	LC-17	SLC-2
Delta III	LC-17	N/A
Delta IV Family	LC-37	SLC-6
Athena I & II	LC-46 or -20	California Spaceport
Taurus	LC-46 Or -20	SLC-576E
Titan II	N/A	SLC-4W
Pegasus XL	CCAFS skidstrip KSC SLF	VAFB airfield

Table 2: Summary of Envelope Spacecraft Subsystems and Envelope Payload Characteristics (EPC)

Structure	**Unlimited:** aluminum, magnesium, carbon resin composites, and titanium **Limited:** beryllium [50 kg (110 lb)]
Propulsion	Mono- and bipropellant fuel; 1000 kg (2200 lb) (hydrazine); 1000 kg (2200 lb) (monomethyhydrazine) Bipropellant oxidizer; 1200 kg (2640 lb) (nitrogen tetroxide) Ion-electric fuel; 500 kg (1100 lb) (Xenon) SRM; 600 kg (1320 lb) (AP)-based solid propellant
Communications	Various 10-100 W (RF) transmitters
Power	Solar cells; 150 A-Hr ($Ni-H_2$) battery; 300 A-Hr (LiSOC) battery; 150 A-Hr (NiCd) battery
Science instruments	10 kW radar ANSI safe lasers (Section 4.1.2.1.3)
Other	Class C EEDs for mechanical systems deployment Radioisotopes limited to quantities that are approved for launch by NASA Nuclear Flight Safety Assurance Manager Propulsion system exhaust and inert gas venting

Environmental Checklist for Flight Projects

1. Project/Program

Lunar Reconnaissance Orbiter

2. Points of Contact

Project Manager: Craig Tooley Code: 431 Telephone: 6-1331

3. Schedule

Formulation Process (Phase A/B): Thru Feb 06
Implementation Process (Phase C/D): Feb 06-Oct 08
Launch Date: Oct 08
PDR/CR: PRD Feb 7-9,06 CDR Oct-Nov 06

4. Current status

At Phase D (build phase)

5. Project Description

a. Purpose: EELV launch to lunar orbit. Engineer and science exploration of lunar surface and potential landing sites

b. Spacecraft: GSFC Built

c. Instruments: LROC (camera) LOLA (Laser altimeter) LAMP (temperature map of dark regions) Diviner (Maps temperature, rock abundance) CRaTER (affects of radiation on Human Tissue) LEND (Neutron Detector) Tech demo Mini-RF

d. Launch Vehicle: Atlas V

e. Launch Site: KSC

f. NASA's Involvement/Responsibility: GSFC is responsible for project management, spacecraft build, instrument build (LOLA) and other instrument I&T, launch and mission operations from GSFC

g. Participants/Locations: UoMd/Russian-LEND Instrument, SwRI Lamp instrument, JPL/UCLA Diviner Instrument, MSSS, LROC instrument, GSFC, LOLA instrument, BU/MIT, CRaTER Instrument, DoD/SOMD/APL Tech Demo Mini-RF

h. End of Mission, Re-entry: None. Orbiter is designed to crash land on the moon

6. Is there anything controversial about the mission?

None

7. Is there anything unique, unusual, exotic about the mission, spacecraft, and instruments?

Laser instrument pointed at the lunar surface

8. Is there any environmental documentation for spacecraft, launch vehicle (NEPA or EO12114)?

no

9. Is the mission compliant with NASA policy and guidelines for Orbital Debris (NPD 8710.3 and NSS 1740.14)? Explain

Yes, with the exception of the LV upper stage (Guideline 4-1)

10. Has an Air Force Form 813 been completed? (Please attach copy)

no

11. During any phase does the mission/project include or involve:

Check all that apply. If uncertain indicate with a "?"
For all that apply provide an explanation. Use the additional space below if needed.

X ___ a. Fuels
X ___ b. Radioactive Materials ___ low calibration source during I&T at GSFC
x ___ c. Explosives NSIs
X ___ d. Chemicals Nothing more hazardous than IPA for cleaning
X ___ e. Hazardous Materials/Substances
X ___ f. Lasers (Class, Earth Pointing) Lunar pointing
___ g. Disease Producing Pathogenic Microorganisms
___ h. Hazardous Wastes
X ___ i. High Noise Levels Launch & acoustic testing generate high noise levels
___ j. Sample Return to Earth
X ___ k. Ionizing or Nonionizing Radiation Laser, RF transmitters at S & Ka-band
___ l. New or Foreign Launch Vehicle

___ m. Impact on Local Social or Economic Conditions
___ n. Removal of Vegetation or Destruction of Habitat
___ o. Impact/Affect on Minority or Low Income Populations
___ p. Construction/Modification of a Facility
___ q. Land Disturbance, Tree Clearing, removal of vegetation
X ___ r. Discharges of any substances into air, water, or soil Launch vehicle discharges exhaust into the atmosphere
___ s. Require any environmental permit

______t. Threatened or Endangered Species________________________
______u. Sensitive Wildlife Habitat______________________________
______v Areas of Historical or Cultural Significance__________________
______w. Other Issues of Potential Environmental Impact_________________

12. What hazards are associated with the mission?

Laser operation during I&T at GSFC, Low level radiation sources during I&T at GSFC, hydrazine fuel (890 kg)

13. Summary of Subsystems/Components

Structural Materials	Aluminum
Propulsion	Hydrazine
Communications	Ka and S band transponders
Power	28 Volt Lithium ion battery supply
Science Instruments	LAMP, LROC, LOLA, LEND< Diviner, CRaTER, Mini-RF
Hazardous Components (radioactive materials, lasers, chemicals, etc.)	Lasers. Pyros, Low level radiation calibration sources
Other (include dimensions and weight of s/c)	900 kgs dry 140 inches tall by 88 inches wide and 98 inches deep

[signature] 451 craig Tooley — 10/5/07

Project Manager, Code — **Date**

GSFC Routine Payload Checklist

PROJECT NAME: LCROSS		DATE OF LAUNCH: 10/28/2008
PROJECT CONTACT: JOHN MARMIE	PHONE NUMBER: 650.604.6773	MAILSTOP: 240A-3
PROJECT START DATE: 4/1/2006	PROJECT LOCATION: NASA AMES RESEARCH CENTER	

PROJECT DESCRIPTION:
LRO SECONDARY PAYLOAD. LUNAR KINETIC IMPACTOR. CONFIRM PRESENCE/NATURE OF WATER ICE IN A LUNAR SOUTH POLE CRATER.

A. SAMPLE RETURN:	YES	NO
1. Would the candidate mission return a sample from an extraterrestrial body?		X

B. RADIOACTIVE SOURCES:	YES	NO
1. Would the candidate spacecraft carry radioactive materials?		X
2. If yes, would the amount of radioactive sources require launch approval at the NASA Associate Administrator level or higher according to NPG 8715.3 (NASA Safety Manual)?		

Provide a copy of the Radioactive Materials Report as per NPG 8715.3 Section 5.5.2.

C. LAUNCH AND LAUNCH VEHICLES:	YES	NO
1. Would the candidate spacecraft be launched using a launch vehicle/launch complex combination other than those indicated in Table 1 below?		X
2. Would the proposed mission cause the annual launch rate for a particular launch vehicle to exceed the launch rate approved or permitted for the affected launch site?		X

Comments:

D. FACILITIES:	YES	NO
1. Would the candidate mission require the construction of any new facilities or substantial modification of existing facilities?		X
2. If yes, has the facility to be modified been listed as eligible or listed as historically significant?		

Provide a brief description of the construction or modification required:

E. HEALTH AND SAFETY:	YES	NO
1. Would the candidate spacecraft utilize any hazardous propellants, batteries, ordnance, radio frequency transmitter power, or other subsystem components in quantities or levels exceeding the Envelope Payload Characteristics (EPC's) in Table 2 below?		X
2. 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 (EP)?		X
3. Would the candidate mission release material other than propulsion system exhaust or inert gases into the Earth's atmosphere or space?		X
4. Would launch of the candidate spacecraft suggest the potential for any substantial impact on public health and safety?		X
5. Would the candidate spacecraft utilize a laser system that does not meet the requirements for safe operation (ANSI Z136.1-2000 and ANSI Z136.6-2000)? For Class III-B and IV laser		X

		YES	NO
	operations, provide a copy of the hazard evaluation and written safety precautions (NPG 8715.3).		
6.	Would the candidate spacecraft contain pathogenic microorganisms (including bacteria, protozoa, and viruses) which can produce disease or toxins hazardous to human health?		X
Comments:			
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
Comments:			

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Atlas IIIA & B	LC-36	SLC-3
Atlas V Family	LC-41	SLC-3
Delta II Family	LC-17	SLC-2
Delta III	LC-17	N/A
Delta IV Family	LC-37	SLC-6
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Communications	Various 10-100 W (RF) transmitters
Power	Solar cells; 150 A-Hr ($Ni-H_2$) battery; 300 A-Hr (LiSOC) battery; 150 A-Hr (NiCd) battery
Science instruments	10 kW radar ANSI safe lasers (Section 4.1.2.1.3)
Other	Class C EEDs for mechanical systems deployment Radioisotopes limited to quantities that are approved for launch by NASA Nuclear Flight Safety Assurance Manager Propulsion system exhaust and inert gas venting

GODDARD SPACE FLIGHT CENTER ENVIRONMENTAL CHECKLIST FOR FLIGHT PROJECTS

1. PROJECT/PROGRAM LCROSS (Lunar Crater Observation and Sensing Satellite)		
2. POINTS OF CONTACT		
Name: John Marmie	Code: PX	Phone No.: 650.604.6773
3. SCHEDULE		
PDR/CDR: 9/2006 2/2007	Launch Date: 10/28/2008	
4. CURRENT STATUS		
On-Schedule. Entering integration phase.		
5. PROJECT DESCRIPTION		
a. Purpose: Confirm the presence/nature of water ice in a lunar south pole.		
b. Spacecraft: ESPA based.		
c. Instruments: NIR spectrometers (2), NIR Cameras, (2) MIR cameras (2), UV/Visible Camera (1), Visible spectrometer, Photometer		
d. Launch Vehicle: ATLAS V		
e. Launch Site: KSC		
f. NASA's Involvement/Responsibility: Project Management, Mission Ops, Science/Payloads.		
g. Participants/Locations: NASA Ames, Moffett Field, CA, Northrop-Grumman, Redondo Beach, CA and Lanham MD.		
h. End of Mission, Re-entry: EOM 2/2009 no S/C re-entry.		
6. Is there anything controversial about the mission?		
No.		
7. Is there anything unique, unusual, or exotic about the mission, spacecraft, and instruments?		
No.		
8. Is there any environmental documentation for spacecraft, launch vehicle (NEPA or EO12114)?		
No.		
9. Is the mission (s/c and LV) compliant with NASA policy and guidelines for orbital debris (NPD 8710.3 and NSS 1740.14)? Explain non -compliances.		

Yes, but need to put together a formal orbital debris report.

10. Has an Air Force Form 813 been completed? *(Please attach copy)*	☐ YES ☒ NO

11. During any phase, does the mission/project include or involve:
Check all that apply. If uncertain, indicate with a "?"
For all that apply, provide an explanation. Use the additional space below if needed.

X	a. Fuels
	b. Ionizing Radiation Devices/Sources
	c. Explosives
	d. Hazardous Materials/Substances/Chemicals
	e. Lasers (Class, Earth Pointing)
	f. Disease Producing Pathogenic Microorganisms
	g. Discharges of any Substances into Air, Water, or Soil
	h. Hazardous Wastes
	i. High Noise Levels
	j. Sample Return to Earth
X	k. Radio Frequency Communications
	l. Construction/Modification/Demolition of a Facility
	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 (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. Require any Environmental Permit

Additional Information

12. What Safety hazards are associated with the mission?

Lower Stage re-entry.

13. Summary of subsystem components

Structural Materials	Aluminum: ESPA ring, and secondary structures.
Propulsion	Thrusters
Communications	S-Band Transponder
Power	Solar Array, LION batteries
Science Instruments	NIR spectrometers (2), NIR Cameras (2), MIR Cameras (2), UV/Visible spectrometer, Visible Camera, Photometer
Hazardous Components (radioactive materials, lasers, chemicals, etc.)	Hydrazine
Other (include dimensions and	1000 kgs, 3m diameter x 2.1m height

weight of s/c)		
PROJECT MANAGER SIGNATURE		DATE 6/16/2007