APPENDIX C
ALPHA CUBESAT SLS PAYLOAD QUESTIONNAIRE <FWD-003>

PAYLOAD INFORMATION	
General Information Explanation	**Payload Customer Input:**
Use payload full name & acronym in parentheses.	Alpha CubeSat (ACS)
Name of the organization sponsoring the payload. This may be an international partner or a NASA research integration office or other.	NASA Cube Quest Challenge
Need contact name for future payload resource questions.	Principal Investigator (PI): Gary P. Barnhard Project Manager (PM): Ethan Chew Interface Engineer (IE): Michael Doty
Contact e-mail address and phone number, including area code.	E-mail Address: gary.barnhard@xisp-inc.com Phone Number: +1 301 229 8012
Contact address to include street, city, state, & zip code.	Team Alpha CubeSat c/o XISP-Inc 8012 MacArthur Boulevard Cabin John, MD 20818-1608
Can be Astronomy, Astrophysics, Exploration, or other. Please denote as manned or unmanned.	Other, unmanned
Briefly describe the payload in its deployed and stowed formation. Include brief listing of key subsystems.	**Stowed configuration:** *1Ux2Ux3U (6U total volume)* CubeSat accommodated by NASA furnished Planetary Services 6U launcher. Systems/subsystems include: Ka Band radio, Nitrous Oxide & Infused Paraffin hybrid orbital injection motor, ion thrusters (four) with solid iodine propellant, body mounted conformal integrated solar array & receive/transmit antenna, integrated Electrical Power System with batteries, power management and distribution, Data Management System, Attitude Determination & Control System,

	Guidance Navigation & Control System, Thermal System, Primary Payload, Structures & Mechanisms, and Scar for Secondary Payload (future). **Deployed Configuration:** *1Ux2Ux3U (6U total body volume)* with 36 U deployed surface area of integrated solar array & receive/transmit antenna. . Systems/subsystems include: Ka Band radio, Nitrous Oxide & Infused Paraffin hybrid orbital injection motor, ion thrusters (four) with solid iodine propellant, body mounted conformal integrated solar array & receive/transmit antenna, integrated Electrical Power System with batteries, power management and distribution, Data Management System, Attitude Determination & Control System, Guidance Navigation & Control System, Thermal System, Primary Payload, Structures & Mechanisms, and Scar for Secondary Payload (future).
Briefly describe the objective/operation of the payload.	Successfully navigate from EM-1 translunar trajectory deployment using alternate minimum energy trajectory to deep space target past 4 million kilometers completing various communications challenges (deep space derby), transition to translunar trajectory passing through Earth/Moon L2 and into Lunar orbit, complete various other communications challenges, and finally impact the surface of moon.
List any foreign partnership/participation.	None.
Is any part of the payload or data proprietary? Explain.	Fully optimized orbital trajectories may be patentable. Various System/Subsystem elements may be covered by one or more non-disclosure agreements.
Name of person who completes the questionnaire, if different from PI.	Principal Investigator
Date questionnaire is completed.	July 3, 2015

PAYLOAD PHYSICAL PARAMETERS (STOWED)			
Resource	**Definition**	**Units**	**Payload Needs**
L x W x H	Length and Width (or diameter) and over all Height, in its stowed configuration. (to one decimal place)	in. x in. x in.	9.4 in x 14.4 in x 4.5 in
Weight	Weight of stowed configuration including any propellants and expendables. (to one decimal place)	lbm	30.9 lbm
Center of Gravity	Estimate the stowed payload center of gravity with the reference plane starting at the base of the payload. Coordinates of X, Y, & Z with X being along the centerline of the vehicle. (to on decimal place)	X = in. Y = in. Z = in.	X= 0 in. Y = 2.3 in. Z = 7.2 in.
Cube Class	3U, 6U, 12U, larger, or different class	xU	6U
Unit Count	Number of deployable objects within payload (cluster or swarm)	1, 2, …., x	One (1), Alpha Cubesat spacecraft
Transmission Frequency	Identify what frequency your payload will use to communicate with ground or other. Stipulate difference between receiving and transmitting frequencies.	MHz & Watts	Spacecraft: Alpha CubeSat Ka Band, TX, 32 GHz, 7 Watts Ground Station: DSS-25 Ka Band, RX, 28 GHz, 25 Watts

PAYLOAD GROUND TRANSPORT TO KSC			
Resource	**Definition**	**Units**	**Payload Needs**
Power	No power in transport, acceptable?	Yes or No	Yes
Temperature	Ambient Environment (45° to 100°F), acceptable?	Yes or No	Yes
Vibration	Define, if any, shipping "g" limits?	g	None specified, no requirement
Shock	Define, if any, drop shock limits?	g	None specified, no requirement
Environment Monitoring	Does the payload need thermal /vibration limit/shock limit / humidity monitoring during ground transport?	Yes or No: If Yes, List Environments to be Monitored	None specified, no requirement
Other	List any other needs or resources to the payload.	Optional	None specified, no requirement

PRE/POST PAYLOAD INTEGRATION IN MSA (AT MPCV FACILITY OR AT VAB)			
Resource	**Definition**	**Units**	**Payload Needs**
Power	Is 28Vdc trickle charge [TBR] needed?	Yes or No	Yes
	If yes, what amperage?	Amps	1.0 Amp would be acceptable [TBR]
	If yes, how long is trickle power needed?	hours, days, or weeks	Until umbilical is disconnected from payload ring prior to launch, objective is to launch fully charged
	List type & power size of battery in payload.	NiCad, Li ion, etc. Volts & watts	Li-Ion 2.6 Ahr + up 5.2 Ahr addon if volume and mass budget permit 12 +/- 2Vdc
Environment Restrictions	Are there any environment restrictions (temp., humidity, etc.)?	Show Appropriate Unit	None specified, no requirement
Facility Support	Will you perform any test & check-out before payload/deployer installed in MSA?	Yes or No If Yes, brief description of activities.	Yes. The battery state of charge will be verified and a check for any damages incurred during transportation will be conducted. If not required to do previously, the installation of the Nitrous Oxide gas bottle (open the deployer, insert bottle, and screw in to stop) and verification that there are no leaks will be performed at this point. The status of any remaining remove-before-flight inhibits will be verified and their removal coordinated with the MSA installation team.
	List needed services.	Power, N2, etc.	Power
	List needed equipment.	Table,	Table, lighting, Nitrous Oxide

		lighting, etc.	sniffer, camera, electrical pig tail, laptop, test & status verification software.
Other	List any other needs or resources to the payload.	Optional	None have been identified at this time.

PAYLOAD ON THE PAD (PRELAUNCH)			
Resource	**Definition**	**Units**	**Payload Needs**
Pad Dwell Time	Can payload handle 2 months on pad without services (i.e. trickle charge)?	Yes or No If No, what is maximum dwell time?	Yes.
Dry N2 Purge	Can payload handle a 6 to 12 hour dry nitrogen purge during vehicle tanking, prior to lift-off?	Yes or No	Yes.
	Can payload handle a temperature range of (-100°F to 80°F)?	Yes or No	No. There are issues with respect to the cold side of the temperature range. This can be mitigated by the use of the trickle charge and/or turning on some portion of the equipment.
Other	List any other needs or resources to the payload.	Optional	None have been defined at this time.

PAYLOAD DURING ASCENT (LAUNCH THROUGH MPCV DEPARTURE & DISPOSAL BURN (~4 TO 5 HOURS)			
Resource	**Definition**	**Units**	**Payload Needs**
Ascent	Can payload handle maximum vibration level of [**TBD-002**]?	Yes or No	Yes [Payload track as a requirement and will be tested to value when specified]
	Can payload vent air during ascent at the rate of x.x psi/sec?	Yes or No	Yes [Payload track as a requirement and will be tested to value when specified]

	Does the payload contain any pressure vessels or trapped gas enclosures?	Yes or No If Yes, then describe volumes & pressures.	Yes. Nitrous Oxide cylinder. Current place holder is Department of Transportation (DOT) approved Nitrous Oxide bottle. The bottle includes an NOS/CGA-approved high-flow valve and built-in siphon tube. For extra safety, an NOS exclusive blow-off venting system is included. If the bottle is overfilled or if pressure increases beyond the maximum safety level, the vent opens and discharges the nitrous in a [TBR] safe direction.
	List any other needs or resources to the payload.	Optional	None have been defined at this time.

PAYLOAD DEPLOYMENT (POST ICPS DISPOSAL BURN, PRE SECONDARY PAYLOAD SYSTEM SHUTDOWN) FIRST DEPLOYMENT OPPORTUNITY IS L+ 4 TO 5 HOURS. MOON WILL BE 3.5 TO 8.5 DAYS AWAY DEPENDING ON LAUNCH WINDOW. LAST CHANCE FOR PAYLOAD DEPLOYMENT WILL BE 8 TO 9 DAYS [TBR] DAYS AFTER ICPS DISPOSAL BURN.			
Resource	**Definition**	**Units**	**Payload Needs**
Deployment	Describe point when payload is to be deployed. Link to time after MPCV departure.	hours or days	Nominally
	Can payload accommodate a 4.6 ft/sec. min. deployment rate?	Yes or No	Yes.
	If other rate desired, specify.	ft./sec.	[TBR]
	Does payload deployment coincide with another payload?	Yes or No	No.
	If yes, identify other payload & state order of deployment.	Brief Description	Not applicable.
	Does payload deploy or expand beyond its stowed configuration?	Yes or No If Yes, give final dimensions ft x ft x ft	Yes. 0.78417 ft x 1.20083 ft x 2.7725 ft
	Can payload delay expansion process by 5 to 10 seconds from deployment?	Yes or No	Yes.
Pointing	Does payload need to be deployed in a particular direction?	Yes or No	No.

	If yes, describe target direction (moon, Earth, other, etc.)	Optional	Not applicable at this time.
Trigger Signal	Does payload need a trigger signal prior to deployment?	Yes or No	No
	If yes, how much time before deployment?	minutes	Not applicable at this time.
Communication	State method for communicating w/ground or other points.	Brief Description	Ka Band radio is the baseline means of transmission and reception. Alternate UHF system may be incorporated subject to mass and volume constraints.
	How long after deployment will payload start transmitting data?	sec., min., hours	30 minutes or less is current baseline. [TBR]
Other	List any other needs or resources to the payload.	Optional	The NASA Deep Space Network will provide support for orbit determination pursuant to the documented Cube Quest Challenge government provided services description in the . "Required Navigation Artifacts for Authenticating Claimed Communications Distances, and Verifying Achievement and Maintenance of Lunar Orbit for Compliance with Cube Quest Challenge Rules – Draft 1.4 January 6, 2015" and subsequent versions.

Disposal	What is method of payload disposal?	Earth reentry, crash on Moon, deep space, other	Crash on the Moon.

OTHER INFORMATION: OPTIONAL
(1) Reference complete Conceptual Design data package