Blue Canyon Technologies
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December 30th, 2015

To Whom It May Concern:

This letter provides detail regarding our experimental license request #0810-EX-PL-2015 for the RAVAN cubesat.

Blue Canyon Technologies (BCT) is building the spacecraft for the Radiometer Assessment using Vertically Aligned Nanotubes (RAVAN) project, which is led by the Johns Hopkins University Applied Physics Laboratory (JHU/APL), with partners L-1 Standards and Technology, Inc. and Draper Laboratory, and funded by NASA's Earth Science Technology Office under a government contract.

The objective of the RAVAN project is to demonstrate a radiometer that is compact, low-cost, and low-uncertainty. The radiometer uses a gallium fixed-point black body as a built-in calibration source and a vertically aligned carbon nanotube (VACNT) absorber. VACNTs are the blackest known substance. Neither the VACNT nor gallium black body has ever been used in an orbiting scientific instrument. Successful demonstration will pave the way for a constellation Earth radiation budget mission that can provide valuable measurements needed to significantly advance our understanding of ongoing and future climate change.

Dr. Scott Palo, who has supported the University of Colorado CSSWE, MinXSS-1, MinXSS-2 and QB50-Challenger cubesat missions is assisting with the frequency licensing for RAVAN.

1. We are requesting an experimental license to work in the amateur radio service. An official letter of coordination has been requested from the International Amateur Radio Union and will be uploaded with our application once it has been received. In accordance ITU Article No. 4.4 RAVAN shall not cause harmful interference to, and shall not claim protection from harmful interference caused by, a station operating in accordance with the radio regulations.

2. Point of contact for receiving JSpOC conjunction assessments.
   John Carvo
   Blue Canyon Technologies
   #200, 2425 55th St, Boulder, CO 80301
   jcarvo@bluecanyontech.com
   (720) 458-0703

3. The RAVAN CubeSat does not have propulsion for making orbit adjustments. The spacecraft is deployed into a 600 km circular orbit, where atmospheric drag will cause the spacecraft altitude to decay over time meeting the orbital debris requirements as determined from our orbital debris analysis. The spacecraft is stabilized using the Blue Canyon Technologies XACT attitude determination and control system. We will

have the ability to respond to any possible conjunction with a modified attitude state from deployment to reentry.

4. An ITU cost recovery letter from George Stafford, President of Blue Canyon Technologies is attached.

5. An ITU cover letter is attached.

6. An ITU SpaceCap file for RAVAN that has been verified by the ITU SpaceVal software to be error free along with 4 attachments showing the required antenna patterns.

Please don't hesitate to contact me (jcarvo@bluecanyontech.com) if you have any additional questions.

Regards,

12/30/15

John Carvo
RAVAN Mission Manager
Blue Canyon Technologies