Orbital Sciences Corporation
21830 Atlantic Blvd.
Dulles, VA 20166

Federal Communications Commission
Experimental Radio Services
P.O. Box 358320
Pittsburgh, PA 15251-5320

Re: Experimental license for Orbital Sciences Corporation

Dear Sir or Madam:

Orbital Sciences Corporation (Orbital) hereby requests approval for an experimental license application with the express purpose of testing Passive Intermodulation Products on a satellite currently in manufacturing. Orbital Sciences is a manufacturer of mid-sized Geo-Synchronous satellites, and the program in question utilizes frequencies that could create low order PIM products that require testing prior to launch into its orbital slot.

Orbital strives to maintain testing environments that minimize stray emissions. The nature of PIM products involves the interaction with any metallic structure within its environment, and therefore, any building related structure incurs significant enough PIM to drown out any products associated with the spacecraft itself. It is with this in mind that Orbital proposes to perform PIM testing external to our facilities, but under the protection of a Radome structure.

In and effort to pre-assess our PIM testing methodology we have already contacted the experimental office with some baseline particulars of our approach. The details included below were tailored from those conversations (although several new frequencies were added). We hope that this will assist you in your review.

In order to eliminate interference with other users, Orbital has details of the proposed PIM testing in the two tables shown below. Descriptions and benefits of these details follow the summary table.

Planned Dates of Testing	2 concurrent days of actual testing within Aug 15th to Sept 30th date range. Exact dates within range are unknown due to variability in manufacturing schedule.
Timeframe of Testing	Between 1:00 am and 5:00 am.
Length of each Test Case	< 2 minutes apiece
Transmit Frequencies	19 Frequencies - See Test Case Table Below (some frequency reuse): 10951 MHz, 10952 MHz, 10995 MHz, 11020 MHz, 11451 MHz, 11451.5 MHz, 11496 MHz, 11698 MHz, 11699 MHz, 12511 MHz, 12520 MHz, 12530 MHz, 12550 MHz, 12710 MHz, 12720 MHz, 12726.5 MHz, 12730 MHz, 12748 MHz, 12749 MHz.
Bandwidth of Transmitted Frequencies	40 kHz
Output Power, Azimuth, and Beamwidth of primary beam	See Table Below
Output Power and Azimuth of Ground Based Sidelobe	See Table Below
Polarization(s)	Vertical & Horizontal (See Below)
Antenna Type	Dual gridded reflectors, and directive horns.

Table 1 – Logistical Information

Test Case	TX Frequencies	EIRP @ < 80 deg El.	EIRP @ <20 deg El.	Polarization
1	10995 MHz	57.91 dBWi	< 20 dBWi	Vertical
	12720 MHz	58.78 dBWi	< 20 dBWi	Vertical
2	10995 MHz	57.91 dBWi	< 20 dBWi	Vertical
	12720 MHz	52.90 dBWi	< 20 dBWi	Horizontal
3	11451.5 MHz	16.75 dBWi	< 1 dBWi	Vertical
	12748 MHz	16.75 dBWi	< 1 dBWi	Vertical
4	10952 MHz	16.75 dBWi	< 1 dBWi	Vertical
	12550 MHz	55.83 dBWi	< 20 dBWi	Vertical
5	11451 MHz	16.75 dBWi	< 1 dBWi	Horizontal
	12749 MHz	16.75 dBWi	< 1 dBWi	Horizontal
6	10951 MHz	16.75 dBWi	< 1 dBWi	Horizontal
	12550 MHz	49.93 dBWi	< 20 dBWi	Horizontal
7	11699 MHz	16.75 dBWi	< 1 dBWi	Vertical
	12530 MHz	49.93 dBWi	< 20 dBWi	Horizontal
8	11699 MHz	16.75 dBWi	< 1 dBWi	Vertical
	12520 MHz	55.8 dBWi	< 20 dBWi	Vertical
9	11451 MHz	16.75 dBWi	< 1 dBWi	Horizontal
	12726.5 MHz	52.90 dBWi	< 20 dBWi	Horizontal
10	10995 MHz	57.91 dBWi	< 20 dBWi	Vertical
	12530 MHz	58.70 dBWi	< 20 dBWi	Vertical
11	10995 MHz	57.91 dBWi	< 20 dBWi	Vertical
	12530 MHz	58.70 dBWi	< 20 dBWi	Vertical
12	10995 MHz	57.91 dBWi	< 20 dBWi	Vertical
	12720 MHz	58.78 dBWi	< 20 dBWi	Vertical
13	10995 MHz	57.95 dBWi	< 20 dBWi	Horizontal
	12550 MHz	49.93 dBWi	< 20 dBWi	Horizontal
14	10995 MHz	57.95 dBWi	< 20 dBWi	Horizontal
	12550 MHz	55.83 dBWi	< 20 dBWi	Horizontal
15	11020 MHz	57.91 dBWi	< 20 dBWi	Horizontal
	12511 MHz	58.70 dBWi	< 20 dBWi	Vertical
16	11020 MHz	57.91 dBWi	< 20 dBWi	Vertical
	12511 MHz	52.84 dBWi	< 20 dBWi	Vertical
17	11698 MHz	19.56 dBWi	< 1 dBWi	Vertical
	12730 MHz	58.78 dBWi	< 20 dBWi	Horizontal
18	10951 MHz	16.75 dBWi	< 1 dBWi	Vertical
	12710 MHz	58.78 dBWi	< 20 dBWi	Vertical
19	11020 MHz	57.91 dBWi	< 20 dBWi	Vertical
	12749 MHz	16.75 dBWi	< 1 dBWi	Horizontal
20	11451 MHz	16.75 dBWi	< 1 dBWi	Vertical
	12710 MHz	58.78 dBWi	< 20 dBWi	Vertical
21	11496 MHz	57.91 dBWi	< 20 dBWi	Vertical
	12749 MHz	16.75 dBWi	< 1 dBWi	Horizontal

Table 2 – Test Cases

Descriptions of Testing Methodology Benefits

Due to the fact that testing will be performed external to metallic structures which would normally shield transmitted signals, Orbital Sciences has selected the frequencies, bandwidth, pointing, and timing of the test as methods to control potential interference. The benefits of each of these can best be described as follows:

Transmit Frequency Range– The frequencies noted in the tables above are specific to the GEO Synchronous satellite transmit bands, and as such, will not result in interference to existing operators directly in the path of transmission (satellites on Orbit). Since the tested transmit bands operate with approximately 1.5+ GHz of frequency isolation to the receive band of GEO satellites, no interference to existing users on orbit is expected to occur.

Bandwidth – Orbital will reduce the bandwidth of all transmissions to 40 kHz, which is the minimum setting of the test equipment utilized during testing.

Pointing – The reflectors (high gain) and horns (low gain) utilized during testing maintain a low beamwidth (5 to 10 degrees) which keeps the primary energy focused directly overhead. Rejection at off angles permit the reduction of transmitted energy to below 20 dBWi on reflectors, and below 1 dBWi on horns at elevations less than 20 degrees.

Timing - Orbital perceives the primary risk of interference being the immediate local area around the test facility. Therefore, each test is planned to be performed during the twilight hours (1:00 am to 5:00 am) when nominal activity is at a minimum. Additionally, each test case typically only lasts between 30 seconds and 2 minutes apiece. Most of the time spent during the testing is for setup between testing (when carriers are off).

Based on the above mitigating steps described above, Orbital does not perceive that interference will become an issue. However, in the case that interference does occur, our on-site test coordinator Pete Collis, will be the main point of contact and can be reached at the following work phone number: 703-948-8751. Our backup point of contact will be Troy Bennett, Payload Manager for IS-15, at the following work number: 703-406-5812.

Best Regards,
Troy Bennett
Payload Manager, Orbital Sciences Corporation