Exhibit For
SES Americom, LLC
Somis, California
Call Sign: KA288
Vertex Corporation 6.1 Meter Earth Station

Compliance with FCC Report & Order (FCC96-377) for the 13.75 - 14.0 GHz Band
Analysis and Calculations

1. Background

This Exhibit is presented to demonstrate the extent to which the SES Americom, LLC satellite earth station in Somis, California is in compliance with FCC REPORT & ORDER 96-377. The potential interference from the earth station to US Navy shipboard radiolocation operations (RADAR) and the NASA space research activities in the 13.75 - 14.0 GHz Band is addressed in this exhibit. The parameters for the earth station are:

Table 1. Earth Station Characteristics

- Coordinates (NAD83): 34° 19' 31.0" N, 118° 59' 44.4" W
- Satellite Location for Earth Station: AMC-4 (67.0° W)
- Frequency Band: 13.75-14.0 GHz for uplink
- Polarizations: Linear
- Emissions: N0N, 100KG7W, 10M0G7W, and 36M0G7W
- Modulation: No Modulation and Digital
- Maximum Aggregate Uplink EIRP: 36.5 dBW for the N0N Carrier
  50.5 dBW for the 100 kHz Carriers
  70.5 dBW for the 10 MHz Carriers
  76.0 dBW for the 36 MHz Carriers
- Transmit Antenna Characteristics
  - Antenna Size: 6.1 meters in Diameter
  - Antenna Type/Model: Vertex Corporation
  - Gain: 57.1 dBi
- RF power into Antenna Flange: No Modulation (N0N)
  -20.6 dBW
  or -20.6 dBW/4 kHz (Maximum)

- RF power into Antenna Flange (Continued)

  100 kHz
  -6.6 dBW
  or -20.6 dBW/4 kHz

  10 MHz
  13.4 dBW or 3.4 dBW/MHz
  or -20.6 dBW/4 kHz (Maximum)

  36 MHz
  18.9 dBW or 3.4 dBW/ MHz
  or –20.6 dBW/4 kHz (Maximum)

- Minimum Elevation Angle:
  Somis, CA — 22.5° @ 113.8° Az. (AMC 4) at 67.0° W

- Side Lobe Antenna Gain: 32 - 25*log(θ)

Because the above uplink spectrum is shared with the Federal Government, coordination in this band requires resolution data pertaining to potential interference between the earth station and both Navy Department and NASA systems. Potential interference from the earth station could impact with the Navy and/or NASA systems in two areas. These areas are noted in FCC Report and Order 96-377 dated September 1996, and consist of (1) Radiolocation and radio navigation, (2) Data Relay Satellites.

Summary of Coordination Issues:

1) Potential Impact to Government Radiolocation (Shipboard Radar)
2) Potential Impact to NASA Data Relay Satellite Systems (TDRSS)

2. Potential Impact to Government Radiolocation (Shipboard Radar)

Radiolocation operations (RADAR) may occur anywhere in the 13.4 – 14.0 GHz frequency band aboard ocean going United States Navy ships. The Federal Communication Commission (FCC) order 96-377 allocates the top 250 MHz of this 600 MHz band to the Fixed Satellite Service (FSS) on a co-primary basis with the radiolocation operations and provides for an interference protection level of -167 dBW/m^2/4 kHz.

The closest distance to the shoreline from the Somis earth station is approximately 28.77 km Southwest toward the Pacific Ocean. The calculation of the power spectral density at this distance is given by:

		N0N	100 kHz	10.0 MHz	36.0 MHz
1.	Clear Sky EIRP:	36.5 dBW	50.5 dBW	70.5 dBW	76.0 dBW
2.	Carrier Bandwidth:	CW Signal	100 kHz	24 MHz	36 MHz
3.	PD at antenna Input: (dBW/4 kHz)	-20.6	-20.6	-20.6	-20.6
4.	Transmit Antenna Gain:		57.1 dBi		
5.	Antenna Gain Horizon:		FCC Reference Pattern		
6.	Antenna Elevation Angle:		22.5°		

The proposed earth station will radiate interference toward the Pacific Ocean according to its off-axis side-lobe performance. A conservative analysis, using FCC standard reference pattern, results in off-axis antenna gains of -4.8 dBi toward the Pacific Ocean.

The signal density at the shoreline, through free space is:

N0N Carriers (CW Carrier)
PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBw-m^2).

= -20.6 dBw/4 kHz + (-4.8) dBi – 10*log[4Π*(28770m)^2]
= -125.6 dBW/m^2/4 kHz + Additional Path Losses (~41.8 dB)
= -167.4 dBW/m^2/4 kHz

100 kHz Carriers
PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBw-m^2).

= -20.6 dBw/4 kHz + (-4.8) dBi – 10*log[4Π*(28770m)^2]
= -125.6 dBW/m^2/4 kHz + Additional Path Losses (~41.8 dB)
= -167.4 dBW/m^2/4 kHz

10 MHz Carriers
PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBw-m^2).

= -20.6 dBw/4 kHz + (-4.8) dBi – 10*log[4Π*(28770m)^2]
= -125.6 dBW/m^2/4 kHz + Additional Path Losses (~41.8 dB)
= -167.4 dBW/m^2/4 kHz

36 MHz Carriers
PFD = Antenna Feed Power density (dBW/4 kHz) + Antenna Off-Axis Gain (dBi) – Spread Loss (dBw-m^2).

= -20.6 dBw/4 kHz + (-4.8) dBi – 10*log[4Π*(28770m)^2]
= -125.6 dBW/m^2/4 kHz + Additional Path Losses (~41.8 dB)
= -167.4 dBW/m^2/4 kHz

Our calculations identified additional path losses of approximately 41.8 dB including absorption loss and earth diffraction loss for the actual path profiles from the earth station to the nearest shoreline.

The worst case calculated PFD including additional path losses to the closest shoreline location is –167.4 dBW/m^2/4 kHz for the CW Carriers, 100 kHz, 10 MHz, and 36 MHz carriers. This is 0.4 dB below the –167 dBW/ m^2/4 kHz interference criteria of R&O 96-377. Therefore, there should be no interference to the US Navy RADAR from the Somis earth station due to the distance and the terrain blockage between the site and the shore.

3. Potential Impact to NASA's Data Relay Satellite System (TDRSS)

The geographic location of the SES Americom earth station in Somis, California is outside the 390 km radius coordination contour surrounding NASA's White Sands, New Mexico ground station complex. Therefore, the TDRSS space-to-earth link will not be impacted by the SES Americom earth station in Somis, California.

The TDRSS space-to-space link in the 13.772 to 13.778 GHz band is assumed to be protected if an earth station produces an EIRP less than 71 dBW/6 MHz in this band. The 6.1 meter earth station antenna will have an EIRP less than 71 dBW/6 MHz for both the CW carrier and the 100 kHz carriers in this band. The total EIRP for the CW Carrier is 36.5 dBW and the equivalent EIRP per 6 MHz segment will remain at 36.5 dBW/6 MHz. The total EIRP for the 100 kHz, carriers is 50.5 dBW. The equivalent EIRP per 6 MHz segment will remain at 50.5 dBW/6 MHz. Therefore, there should not be interference to the TDRSS space-to-space link for the CW carriers or the 100 kHz carriers. For the 10 MHz and 36 MHz carriers, the total EIRP of 70.5 dBW (10 MHz), and 76.0 dBW (36 MHz) equate to an EIRP per 6 MHz of 68.8 dBW/6 MHz and 70.0 dBW/6 MHz, respectively. Therefore, there should not be interference to the TDRSS space-to-space link for the 10 MHz or the 36 MHz carriers either.

4. Coordination Issue Result Summary and Conclusions

The results of the analysis and calculations performed in this exhibit indicate that compatible operation between the earth station at the Somis facility and the US Navy and NASA systems space-to-earth link are possible for all of the proposed carriers. Operations in NASA systems space-to-space link (13772.0 to 13778.0 MHz) will also be permitted for all of the carriers.