Exhibit For
SES Americom, LLC
South Mountain (Somis), California
Vertex Corporation 9 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 South Mountain (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’ 31.77” N, 118° 59’ 43.8” W
- Satellite Location for Earth Station: SES 10 (68.5° W)
- Frequency Band: 13.75-14.0 GHz for uplink
- Polarizations: Linear
- Emissions: N0N, 100KG7W, 1M00G7W, 36M0G7W and 54M0G7W
- Modulation: No Modulation and Digital
- Maximum Aggregate Uplink EIRP: 39.5 dBW for the N0N Carrier
  53.5 dBW for the 100 kHz Carriers
  63.5 dBW for the 1 MHz Carriers
  79.0 dBW for the 36 MHz Carriers
  80.8 dBW for the 54 MHz Carriers
- Transmit Antenna Characteristics
  Antenna Size: 9.0 meters in Diameter
  Antenna Type/Model: Vertex Corporation
  Gain: 60.1 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 1 MHz 3.4 dBW or -20.6 dBW/4 kHz (Maximum) 36 MHz 18.9 dBW or –20.6 dBW/4 kHz (Maximum) 54 MHz 20.7 dBW or –20.6 dBW/4 kHz (Maximum)
• Minimum Elevation Angle: Somis, CA	 23.7° @ 114.9° Az. (SES 10) at 68.5° 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 South Mountain 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	1.0 MHz	36.0 MHz	54 MHz
1.	Clear Sky EIRP (dBW):	39.5	53.5	63.5	79.0	80.8
2.	Carrier Bandwidth:	CW Signal	100 kHz	1 MHz	36 MHz	54 MHz
3.	PD at antenna Input: (dBW/4 kHz)	-20.6	-20.6	-20.6	-20.6	-20.6
4.	Transmit Antenna Gain:	60.1 dBi				
5.	Antenna Gain Horizon:	FCC Reference Pattern				
6.	Antenna Elevation Angle:	23.7°				

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 – $10*\log[4\Pi*(28770m)^2]$
= -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 – $10*\log[4\Pi*(28770m)^2]$
= -125.6 dBW/m^2/4 kHz + Additional Path Losses (~41.8 dB)
= -167.4 dBW/m^2/4 kHz

1 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 – $10*\log[4\Pi*(28770m)^2]$
= -125.6 dBW/m^2/4 kHz + Additional Path Losses (~41.8 dB)
= -167.4 dBW/m^2/4 kHz

(Continued)

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 – $10*\log[4\Pi*(28770m)^2]$
$= -125.6$ dBW/m^2/4 kHz + Additional Path Losses (~41.8 dB)
$= -167.4$ dBW/m^2/4 kHz

54 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 – $10*\log[4\Pi*(28770m)^2]$
$= -125.6$ 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, 1 MHz, 36 MHz and 54 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 South Mountain 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 South Mountain (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 South Mountain, 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 9 meter earth station antenna will have an EIRP less than 71 dBW/6 MHz for both the CW carrier, 100 kHz and 1 MHz carriers in this band. The total EIRP for the CW Carrier is 39.5 dBW and the equivalent EIRP per 6 MHz segment will remain at 39.5 dBW/6 MHz. The total EIRP for the 100 kHz, carriers is 53.5 dBW. The equivalent EIRP per 6 MHz segment will remain at 53.5 dBW/6 MHz. The total EIRP for the 1 MHz, carriers is 63.5 dBW. The equivalent EIRP per 6 MHz segment will remain at 63.5 dBW/6 MHz. Therefore, there should not be interference to the TDRSS space-to-space link for the CW carriers or the 100 kHz and 1 MHz carriers. For the 36 MHz and 54 MHz carriers, the total EIRP of 79.0 dBW (36 MHz), and 80.8 dBW (54 MHz) equate to an EIRP per 6 MHz of 73.0 dBW/6 MHz and 74.8 dBW/6 MHz, respectively. To avoid interference to the TDRSS space-to-space link the 36 MHz and 54 MHz carriers will not be used for the transmit spectrum of 13.772 to 13.778 GHz by this earth station.

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 South Mountain (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 with the exception of the 36 MHz and 54 MHz emissions.