Exhibit For
LBiSat LLC
South Jordan, Utah
RSI 9.2 Meter Earth Station
Call Sign: E030342

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 LBiSat LLC satellite earth station planned for South Jordan, Ut 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): 40° 33’ 54.0” N, 111° 54’ 14.0” W
- Satellite Location for Earth Station: (61.0° W) and (109.0° W)
- Frequency Band: 13.75-14.5 GHz for uplink
- Polarizations: H,V
- Emissions: 409KG7D, 36M0G7D and 54M0G7W
- Modulation: Digital

Maximum Aggregate Uplink EIRP: 65.5 dBW for the 409 kHz Carriers
85.5 dBW for the 36 MHz Carriers
72.1 dBW for the 54 MHz Carriers

- Transmit Antenna Characteristics
  - Antenna Size: 9.2 meter in Diameter
  - Antenna Type/Model: RSI KS
  - Gain: 60.2 dBi

RF power into Antenna Flange: 409 kHz
5.3 dBW
or -14.8 dBW/4 kHz (Maximum)

36 MHz
25.3 dBW
or –14.2 dBW/4 kHz (Maximum)

(continued)

54 MHz
11.9 dBW or –29.4 dBW/4 kHz (Maximum

- Minimum Elevation Angle(s):
  South Jordan, Ut 20.5° @ 117.9° Az and 43.0° @ 175.5° Az

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

Because the above uplink spectrum is shared with the Federal Government, coordination in this band require resolution data pertaining to potential interference between the earth stations 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 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 Jordan earth station is approximately 950 km west toward the Pacific Ocean. The calculation of the power spectral density at this distance is given by:

		409 kHz	36.0 MHz	54 MHz
1.	Clear Sky EIRP (dBW):	65.5	85.5	72.1
2.	Carrier Bandwidth:	409 kHz	36 MHz	54 MHz
3.	PD at antenna Input: (dBW/4 kHz)	-14.8	-14.2	-29.4
4.	Transmit Antenna Gain:	60.2 dBi		
5.	Antenna Gain Horizon:	FCC Reference Pattern		
6.	Antenna Elevation Angle:	20.5°		

The proposed earth station will radiate interference toward the ocean according to its off-axis side-lobe performance. A conservative analysis, using FCC standard reference pattern, results in off-axis antenna gains of –7.8 dBi towards the Pacific.

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

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

= -14.8 dBw/4 kHz + (-7.8) dBi – 10*log[4Π*(950000m)^2]
= -153.1 dBW/m^2/4 kHz + Additional Path Losses (~90.7 dB)
= -243.8 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).

= -14.2 dBw/4 kHz + (-7.8) dBi – 10*log[4Π*(950000m)^2]
= -152.2 dBW/m^2/4 kHz + Additional Path Losses (~90.7 dB)
= -242.9 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).

= -29.4 dBw/4 kHz + (-7.8) dBi – 10*log[4Π*(950000m)^2]
= -167.7 dBW/m^2/4 kHz + Additional Path Losses (~90.7 dB)
= -258.4 dBW/m^2/4 kHz

Our calculations show additional path loss of approximately 90.7 dB including absorption loss and earth diffraction loss for the actual path profiles from the proposed earth station to the nearest shoreline.

The calculated PFD including additional path losses to the closest shoreline location is –242.9 dBW/m^2/4 kHz. This is 75.9 dB below the –167 dBW/m2/4 kHz interference criteria of R&O 96-377. Therefore, there should be no interference to the US Navy RADAR from the South Jordan earth station due to the distance and the terrain blocking between the site and the shore.

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

The geographic location of the LBiSat LLC earth station in South Jordan, Utah 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 LBiSat LLC earth station in South Jordan, Ut.

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 9.2 meter earth station antenna will have an EIRP less than 71 dBW/6 MHz for both the 409 kHz and 54 MHz carriers in this band. The total EIRP for the 409 kHz Carrier is 65.5 dBW and the equivalent EIRP per 6 MHz segment will remain at 65.5 dBW/6 MHz. The total EIRP for the 54 MHz

carriers is 72.1 dBW. The equivalent EIRP per 6 MHz segment will be 63.1 dBW/6 MHz. Therefore, there should not be interference to the TDRSS space-to-space link for the 409 kHz and 54 MHz carriers.

For the 36 MHz carrier the total EIRP of 85.5 dBW equates to an EIRP per 6 MHz of 79.5 dBW/6 MHz. To avoid interference to the TDRSS space-to-space link the 36 MHz carriers will not be used for the transmit spectrum of 13.772 to 13.778 GHz by this earth station.

Note 1: In order to meet the 71 dBW/6 MHz interference criteria, the earth station would have to be limited to a maximum total EIRP of 77 dBW for the 36 MHz carrier.

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 Jordan earth station and the US Navy and NASA systems is probable. These analyses have been based on the assumption of 406 kHz, 36 MHz and 54 MHz bandwidth digital video and/or data transmissions. Should signals with significantly lower bandwidths be transmitted, the station total EIRP should also be reduced in order to continue to meet the Navy radiolocation and NASA space research interference criteria.

No interference to US Navy RADAR operations from the South Jordan, Utah site earth station will occur.