

**Exhibit For  
Upstream Investments, LLC  
Lafayette, Louisiana  
General Dynamics 8.1 Meter Earth Station  
Call Sign: E090095**

**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 Upstream Investments, LLC satellite earth station in Lafayette, Louisiana 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): 30° 10' 03.1" N, 92° 03' 34.5" W
- Satellite Location for Earth Station: Amazonas-2 at 61.0° W
- Frequency Band: 13.75-14.0 GHz for uplink
- Polarizations: Linear
- Emissions: 4M00G7D
- Modulation: Digital
- Maximum Aggregate Uplink EIRP: 65.0 dBW for all Carriers
- Transmit Antenna Characteristics
  - Antenna Size: 8.1 meters in Diameter
  - Antenna Type/Model: General Dynamics
  - Gain: 59.7 dBi
- RF power into Antenna Flange: 5.3 dBW or -0.7 dBW/ MHz  
or -24.7 dBW/4 kHz (Maximum)
- Minimum Elevation Angle:  
Lafayette, La. 41.3° @ 129.8° Az. (Amazonas-2) at 61.0° W
- Side Lobe Antenna Gain:  $32 - 25 \cdot \log(\theta)$

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  $-167 \text{ dBW/m}^2/4 \text{ kHz}$ .

The closest distance to the shoreline from the Lafayette earth station is approximately 54 km South toward the Gulf of Mexico. The calculation of the power spectral density at this distance is given by:

- |                             |                       |
|-----------------------------|-----------------------|
| 1. Clear Sky EIRP:          | 65.00 dBW             |
| 2. Carrier Bandwidth:       | 4.0 MHz               |
| 3. PD at antenna input:     | -24.7 dBW/4 kHz       |
| 4. Transmit Antenna Gain:   | 59.7 dBi              |
| 5. Antenna Gain Horizon:    | FCC Reference Pattern |
| 6. Antenna Elevation Angle: | 41.3°                 |

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 -8.4 dBi towards the Gulf of Mexico.

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

$$\begin{aligned} \text{PFD} &= \text{Antenna Feed Power density (dBW/4 kHz)} + \text{Antenna Off-Axis Gain (dBi)} - \text{Spread Loss (dBw-m}^2\text{)} \\ &= -24.7 \text{ dBw/4 kHz} + (-8.4 \text{ dBi}) - 10*\log[4\pi*(54000\text{m})^2] \\ &= -138.7 \text{ dBW/m}^2/4 \text{ kHz} + \text{Additional Path Losses (~53.7 dB)} \end{aligned}$$

Our calculations show additional path loss of approximately 53.7 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  $-192.4$  dBW/m<sup>2</sup>/4 kHz. This is 25.4 dB below the  $-167$  dBW/m<sup>2</sup>/4 kHz interference criteria of R&O 96-377. Therefore, there should be no interference to the US Navy RADAR from the Lafayette 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 Upstream Investments, LLC earth station in Lafayette, Louisiana 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 Upstream Investments, LLC earth station in Lafayette, Louisiana.

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 8.1 meter earth station will have an EIRP less than 71 dBW/6 MHz in this band. The maximum EIRP for the 4.0 MHz carrier is 65.0 dBW/6 MHz. Therefore, the emission will meet the 71 dBW/6 MHz criteria.

### **4. Coordination Issue Result Summary and Conclusions**

The results of the analysis and calculations performed in this exhibit indicate that operations between the Lafayette earth station, US Navy systems and NASA earth-to-space and space-to-space segments are compatible.

Interference into US Navy RADAR operations from the Lafayette, Louisiana earth station will not occur, and interference with NASA's TDRSS satellite will also not occur.