

Exhibit D-1
HUGHES NETWORK SYSTEMS
E060382 and E060383
Request for Modification

| RADIATION CALCULATIONS FOR 9.20 meter EARTH STATION | | | |
|---|----------------------------------|-----------------------------|--|
| Nomenclature | Formula | Value | Unit |
| INPUT PARAMETERS | | | |
| M = Antenna Aperture Major Axis m = Antenna Aperture Minor Axis d = Diameter of Feed Mouth f = frequency | | 9.20 9.20 0.102 30 | meters meters meters GHz |
| P = Max Power into Antenna | | 220.0 | Watts |
| n = Aperture Efficiency | | 51% | |
| k = Wavelength @ 30.00 GHz | | 0.0100 | meters |
| CALCULATED VALUES | | | |
| A = Area of Reflector | $P \times M \times m / 4$ | 66.476 | meters ² |
| l = Length of Near Field | $M^2 / 4k$ | 2117 | meters |
| L = Beginning of Far Field | $0.6M^2 / k$ | 5082 | meters |
| G = Antenna Gain @ 30.00 GHz | $n(4 \times \pi \times A) / k^2$ | 4,266,254 | (66.3) dBi |
| a = Area of Feed Mouth | $\pi \times d^2 / 4$ | 0.0082 | meters ² |
| POWER DENSITY CALCULATIONS | | | |
| Region | Maximum Power Density in Region | | Hazard Assessment (FCC MPE Limit = 1 mW/cm ²) |
| | Formula | Value (mW/cm ²) | |
| 1 Near Field | $4nP/A$ | 0.71 | < FCC MPE Limit |
| 2 Far Field | $GP / (4(\pi)L^2)$ | 0.30 | < FCC MPE Limit |
| 3 Transition | <= Nr Fld Region | 0.71 | < FCC MPE Limit |
| 4 Near Reflector Surface | $4P/A$ | 1.38 | > FCC MPE Limit (See Exhibit A) |
| 5 Between Reflector & Ground | P/A | 0.35 | < FCC MPE Limit |
| 6 Between Subreflector and Feed | $4P/a$ | 11258.9 | > FCC MPE Limit (See Exhibit A) |