

ATTACHMENT A – Radiation Hazard Analysis for Cheyenne

| RADIATION HAZARD CALCULATIONS FOR 13.2 meter EARTH STATION |                                 |                             |  |
|--|---------------------------------|-----------------------------|--|
| Nomenclature   | Formula                         | Value                       | Unit   |
| <b>INPUT PARAMETERS</b>                                    |                                 |                             |  |
| D = Antenna Diameter                                       |                                 | 13.20                       | meters   |
| d = Diameter of Feed Mouth                                 |                                 | 0.029                       | meters   |
| P = Max Power into Antenna                                 |                                 | 126                         | Watts  |
| n = Apperture Efficiency                                   |                                 | 47%                         |  |
| k = Wavelength @ 29.9 GHz                                  |                                 | 0.0100                      | meters   |
| <b>CALCULATED VALUES</b>                                   |                                 |                             |  |
| A = Area of Reflector                                      | $\pi D^2/4$                     | 136.848                     | meters <sup>2</sup>  |
| l = Length of Near Field                                   | $D^2/4k$                        | 4342                        | meters   |
| L = Beginning of Far Field                                 | $0.6D^2/k$                      | 10420                       | meters   |
| G = Antenna Gain @ 29.9GHz                                 | $n(\pi D/k)^2$                  | 8,029,772                   | 69.0 dBi   |
| a = Area of Feed Mouth                                     | $\pi d^2/4$                     | 0.0007                      | meters <sup>2</sup>  |
| <b>POWER DENSITY CALCULATIONS</b>                          |                                 |                             |  |
| Region   | Maximum Power Density in Region |                             | Hazard Assessment<br>(FCC MPE Limit = 5 mW/cm <sup>2</sup> ) |
|  | Formula                         | Value (mW/cm <sup>2</sup> ) |  |
| 1 Near Field   | $4nP/A$                         | 0.17                        | < FCC MPE Limit  |
| 2 Far Field  | $GP/(4(\pi)l^2)$                | 0.07                        | < FCC MPE Limit  |
| 3 Transition   | $\leq N_r$ Fld Region           | 0.17                        | < FCC MPE Limit  |
| 4 Near Reflector Surface                                   | $4P/A$                          | 0.37                        | < FCC MPE Limit  |
| 5 Between Reflector & Ground                               | $P/A$                           | 0.09                        | < FCC MPE Limit  |
| 6 Between Subreflector and Feed                            | $4P/a$                          | 76061.3                     | > FCC MPE Limit (See Attachment)                             |