Agreement Failure #1:

Condition 3

Input retinal illuminance of 340.0 uWatts/cm2

Wavelength 580 nm

Stimulus diamter 2.0 degrees

Stimulus duration 100.0 seconds

Eye length 17.0 mm

Pupil diameter 2.0 mm

Assuming ANSI standard eye length of 17.0 mm

Assuming ANSI pupil diameter of 3.0 mm

Excluding limiting cone angle part of photochemical limit calculation

Converts to retinal illuminance of 15.0 log10 quanta/[cm2-sec] (cf. 15.0)

Converts to 5.77 log10 photopic trolands (cf. 5.77)

Converts to 5.31 log10 scotopic trolands (cf. 5.31)

Converts to 185848.3 cd/m2 (cf. 190000.0)

Converts to radiance 31.3 mWatts/[cm2-sr] (cf. 31.3)

Converts to corneal irradiance 29.9 uWatts/cm2 (cf. 29.9)

Converts to total radiant power in the pupil of 0.00094 mW (cf. 0.00094)

MPE calculations

Using pupil factor 5.44 (cf. 5.44)

Effective pupil diameter is 3.0 mm (cf. 3.0)

Using Cb 398.11 (cf. 398.00)

Using Ce 23.27 (cf. 23.30)

Using Ct 1.00 (cf. 1.00)

MPE power in pupil limit 1.37 mWatts (cf. 0.936)

MPE retinal illuminance limit computed as 0.496 Watts/cm2 (cf. 0.339)

Limit - Stimulus log10 difference: 3.2 log10 units

BY HAND:

Size is 2 degrees -> 34.9 mrad.

Duration is 100 seconds.

Wavelength is 580 nm.

-> Need to check dual limits from Table 5b.

Photochemical limit:

MPE = 100\*Cb J/[cm2-sr-1] – integrated source radiance.

Cb = 398.11

MPE = 100\*398.11 J/[cm2-sr-1] – integrated source radiance.

MPE = 398.11 W/[cm2-sr-1] – source radiance

MPE = .381 W/cm2 – corneal irradiance

Thermal limit:

T2 = 21.8316 seconds [differs from Delori’s spreadsheet number, T2 = 10000]

MPE = 1.8 Ce T2-0.25\*1e-3 W/cm-2 – corneal irradiance

Ce = 23.27

MPE = 0.0194 W/cm-2 – corneal irradiance

So, thermal limit applies. Convert corneal irradiance to total power in pupil for a 2 mm pupil.

Maybe Delori’s spreadsheet really uses T2 = 10000, as it indicates, in which case he’d compute the thermal limit as

MPE = 1.8 Ce 1000.75 \*1e-3 J/cm-2 = 1.3246 J/cm-2 – corneal radiant exposure

MPE = .0132 W/cm-2 – corneal irradiance

The ratio .0132/.0194 = 0.68.

The ratio of 0.936/1.37 is also 0.68.

So, this is the difference.