

Kenneth R. Foster & Associates

Electromagnetic Safety Consulting

April 2, 2008

Mr. Mosabber Zaman
Senior RF Engineer
T-Mobile USA
400 Street Road
Bensalem PA 19020

Re: T-Mobile Site 1BL6450F (Medford United Methodist Church)

Dear Mr. Zaman:

This is in response to your request for an estimate of the levels of radiofrequency (RF) electromagnetic energy associated with a proposed T-Mobile radio installation. The antennas will be mounted inside the steeple of the United Methodist Church, 2 Hartford Road, Medford, NJ. I provide an opinion regarding the compliance of the site with FCC and NJ limits for human exposure to radiofrequency energy.

Summary of Findings The maximum exposure to RF energy from the T-Mobile base station will be very far below the relevant FCC exposure limits for the general population. The site meets FCC regulations related to RF energy exposure as stipulated in Part 24 of the FCC Rules and this site has been evaluated based on methods prescribed by the FCC (as contained in FCC Document OET Bulletin 65. The site meets NJ exposure limits (NJAC 7:28-42) by an even larger margin. Antennas for additional low-powered communications systems could be mounted on the structure without exceeding exposure limits.

Technical Data My report is based on plans for the proposed T-Mobile base station that you provided to me on 3/5/08 supplemented by additional information provided on 4/1/08 by Mr. Bryan Grebis from T-Mobile, as well as information about the T-Mobile system that I have obtained on several occasions from the company itself.

The proposed T-Mobile system will include three panel antennas (RFS APX16V-16PVL-E or equivalent) mounted inside the church steeple at a height of 97 ft. above grade. The antennas will be grouped into three sectors, with one antenna per sector. I base my analysis the highest operating level that the company indicates would be considered for the site, corresponding to 12 radios per sector (cumulative ERP of 3000 W in each sector, summed over all radios). This operating level is far higher than that anticipated for the site, and represents the upper physical capacity of the system after maximum expansion. Sometimes T-Mobile makes minor changes in the configuration of the antennas, for example by adding additional antennas or by substituting equivalent antennas. Such changes would not affect the conclusions of this report.

Environmental Levels of RF Energy

Outside the church. I have calculated the power densities of RF energy from the T-Mobile base station, at ground level and at an elevation of 26 ft, at all distances from the transmitting antennas.¹ The calculations are based on upper-limit assumptions: that the base station is broadcasting at maximum power, and that there is constructive interference as the wave reflects from the ground. In practice there is also substantial attenuation of the energy as it passes through buildings, which I do not take into account in my

¹ Calculations were done in accordance with FCC Bulletin 65, "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields", Washington DC 1997.

calculations. I base my analysis on the antennas being directed at an angle of 5 degrees below the horizon, a conservative value. Therefore, my calculations represent upper-limit values. The actual levels of RF signals near the cell site will be below my calculated values.

The results of my analysis are shown in the table below.

Calculated RF Exposure Levels From the Proposed T-Mobile Base Station Installation

Distance From Base of Church Beneath Steeple, ft	Height Above Ground, ft. (Assuming Level Terrain)	Power Density, $\mu\text{W}/\text{cm}^2$ From T-Mobile Base Station
Any distance	Ground level	< 1.5 (maximum field intensity) (< 0.15% of FCC limits*)
Any distance	26 ft. above ground (representative of rooftop level of a two story building)	< 2.5 (maximum field intensity) (< 0.25% of FCC limits)
more than 300 ft from antennas	Any distance above ground (including in the direct beam of the antenna)	< 15 (< 1.5 % of FCC limits)

* FCC exposure limits for the general population are $1000 \mu\text{W}/\text{cm}^2$ at PCS frequencies. Exposure limits apply to any member of the population, for exposures of any duration. Signal levels are calculated on the basis of the maximum practical buildout on the site, not on present design plans. New Jersey exposure limits (NJAC 7:28-42) are five times higher than FCC limits.

Inside the church The proposed facility will employ directional antennas mounted within the steeple, facing away from the building. Antennas of this type transmit significant energy only from their front surfaces, and transmit very little energy in the downward or backward directions. Consequently, RF signal levels anyplace within the church or on its roof will be very low, and certainly far below FCC limits. Likewise, the RF signal levels at all places inside the steeple itself will be below FCC limits.

Close approach to the antennas As with any cellular or PCS transmitting antenna, RF field levels might exceed FCC exposure limits within a few feet (typically within 5 ft) directly in front of the transmitting surfaces of the antennas if the exposure is sustained for sufficiently long times (several minutes or more). Because of the location of the antennas, within the steeple and more than head height above the church roof, it would be highly unlikely that personnel would be located in front of the transmitting surfaces of the antennas. That might be possible, however, during certain maintenance operations on the steeple. Appropriate signage or other measure is recommended to ensure that RF exposure levels to personnel on the roof are kept below FCC limits.

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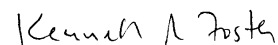
Discussion The RF signal levels from the proposed T-Mobile base station will be far below FCC exposure limits. To put matters in perspective, base stations from communications systems, including those of T-Mobile, operate at power levels comparable to those from many other low-power communications facilities, such as police, fire, ambulance, and other municipal communications systems. These power levels are far below those used by many commercial TV and radio broadcast transmitters, and the levels of RF signal they produce in publicly accessible areas are characteristically very far below pertinent exposure limits.

The biological effects of RF energy have been extensively studied, and there are several thousand reports in the scientific literature on this subject. These reports have been critically reviewed by numerous independent panels, most recently the Institute of Electrical and Electronics Engineers and the International Commission on Nonionizing Radiation Protection. These groups have affirmed existing health standards, or have developed and proposed health standards for exposure to RF energy, which are broadly similar to the FCC limits cited in the table above.

National Telecommunications Act of 1996 This Act provides that “no state or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the [Federal Communications] commission’s regulations concerning such emissions.” That is certainly the case with the installation considered here.

For Further Information The Federal Communications Commission (FCC) maintains a World Wide Web site at <http://www.fcc.gov>. A general information sheet about possible health and safety issues regarding radiofrequency energy is at: <http://www.fcc.gov/oet/rfsafety/cellpcs.html>.

Sincerely yours,



Kenneth R. Foster, Ph.D., P.E.