Isotrope WIRELESS
Thinking outside the sphere

# Cell Sites' Radio Frequency Emissions Compliance Review West Tisbury, Massachusetts

In the Town of West Tisbury, zoning regulations and subsequent permits for wireless facilities require the wireless licensees to fund independent review/survey of emissions from the various approved wireless facilities around town. As with previous occasional reviews, Isotrope was asked by the town to conduct the requisite review.[1]

## Executive Summary

Cell sites at the airport, 21 New Lane, 66 Old Courthouse Road and the DEM Fire Tower off Christiantown Road were found to be operating in compliance with the FCC and Commonwealth of Massachusetts requirements for emissions reaching areas accessible to the general population. The combination of all emissions received at each location tested was below the sensitivity of the instrument, which is 7% of the public safety limits. As explained herein, actual levels of emissions from the cell sites reach the public at levels many orders of magnitude less than the safety limits. The actual emissions around these sites are not even close the the 7% sensitivity limit of the measurement instrument.

[1] Isotrope has a policy of recommending that random periodic review is generally not indicated by best practices for the types of wireless facilities approved in the town. Applicants provide detailed analysis following FCC guidelines when they seek approval of new facilities and subsequent modifications thereof. All wireless facility permitees are subject to FCC and Commonwealth of Massachusetts rules regarding evaluating the combined emissions of all facilities sharing the same site. Based on the emissions assessments provided in permit proceedings, there is ample margin between the predicted emissions accessible to the general public and the established safety limits such that it is essentially not possible for such wireless facilities to approach or exceed the safety limits in publicly accessible areas. We recommend that municipalities reserve the right to request an evaluation or payment to the town for an independent evaluation at such time that the town has a reasonable concern that conditions at a specific site have changed without the town's knowledge. Calendar-based reviews generate a regulatory burden on permittees that are in most cases unnecessary, and an administrative burden on the town regulatory body. Best practices in the field of emissions compliance enable regulators to impose more stringent monitoring conditions in situations where the potential exposure to the general public is close to the limits or where site access controls must be maintained to a high level of security. Such is not the case with the various cell sites in West Tisbury.

## Survey methodology

On August 26, 2021, Isotrope principal David Maxson, WCP, visited the various cell sites operating in West Tisbury, accompanied by West Tisbury Zoning Board Administrator Pam Thors. To measure the entire radio frequency ("RF") spectrum generally in use, a broadband electric field instrument was employed (Narda 8718 meter and 8722-D probe). This instrument captures radio frequencies between 300 kHz (below the mediumwave AM broadcast band) and 50 GHz (encompassing all bands currently standardized for 5G wireless technology and all other predominant uses of the radio spectrum). In addition, to verify that each cell site was operating on one or more licensed channels assigned to each carrier, a spectrum analyzer was employed to monitor the "low band" (600-900 MHz) and "mid band" (1700-2500 MHz) spectrum used by the wireless services.

## Cell Sites

The locations surveyed include the two cell towers located at the Airport (which are also near the public safety tower at the Sheriff's department), 21 New Lane, 66 Old Courthouse Road, and the DEM Fire Tower off Christiantown Road. At each location the broadband instrument was carried around publicly accessible areas near the tower site and was carried up to 100 yards away to ensure no emissions "shadowing" was occurring around the base of the tower.

## Measurements

The broadband instrument reports measurements in percent of the occupational safety limit. The public safety limit is 1/5$^{th}$ of the occupational limit.[2] For reporting in this document, all percentages are converted to percent of the public safety limit. Because the instrument is the broadband type, it has a limited dynamic range. It is specified as providing measurements between 15% and 1500% of the public safety limit. In practice we can obtain noise floor readings (with no substantial emissions present) of about 7% of the public safety limit. Since emissions at such facilities are typically substantially less than the sensitivity of the instrument, we can only indicate signal levels were below the instrument sensitivity but cannot say how much less.

At each site, the spectrum analyzer was consulted to confirm the facility was active. The broadband instrument was field calibrated before beginning measurements at each site.

[2] For convenience, when the emissions are well below the limits, individual "spot" measurements are recorded. Technically, the exposure limits apply to the volume of a body (the "whole-body average" of measurements within a given volume) over a 30-minute averaging period. If no spot measurement is found to exceed the threshold, then there is no need to further assess whole-body-average exposures, or the effect of time-averaging of signals that are often off (not transmitting) more than they are on (transmitting).

As is consistent with prior surveys, at no time was the level of the RF emissions from any of the facilities great enough to exceed the noise floor of the broadband instrument. Thus, we can state unequivocally that the emissions reaching public areas at all the sites are *less than* 7% of the public safety limit.

Spectrum analyzer measurements of individual signals emitted from the cell sites confirmed individual signal levels are substantially less than the 7% sensitivity of the broadband instrument. Taking the strongest signal encountered at any of the sites (using the spectrum analyzer and a calibrated antenna) and converting it to an emissions exposure level, it was about a *millionth* of the public safety limit. In other words, a total of more than one million like emissions coming from one cell site would be necessary to generate potential public exposures approaching the limit at a site. At a busy site, wireless carriers generally operate on less than a dozen frequencies. For the sake of discussion, assume there are four wireless carriers at a tower site each with 12 radio channels transmitting in any given direction. Emissions reaching the public from this hypothetical site would be less than 50 millionths of the public safety limit.

Based on this thumbnail analysis of the strongest received signal at any of the sites in West Tisbury, it can be seen how vanishingly low the actual emissions are around each tower site. Townspeople can be reassured that these facilities are inherently compliant with FCC public safety emissions requirements and there is no practical way they can be activated in an out-of-compliance condition.[3]

David Maxson, WCP
December 2, 2021

[3] Note that such analysis of wireless facilities must be done case by case during the application review process. Cell towers generally satisfy these large margins between actual and maximum allowed public emissions. Special cases where antennas are on rooftops or very short towers or are otherwise very close to occupied areas, require additional attention through safety programs, mitigation and access controls.