Exhibit C – Test Results

8/24/15 – First day of testing

weather: full sun, light to no wind, temperature in mid 70's

LaHarpe Water Tower

37.914422 -95.298479°

3 sector site, approx. 78' from ground to top of rail where antennas are mounted

SW sector (all estimates)

- 5.8GHz: 240 azimuth, 0 downtilt
- 2.4GHz: 230 azimuth, 3 degrees downtilt
- 900Mhz: 250 azimuth, 0 downtilt

NW sector (all estimates)

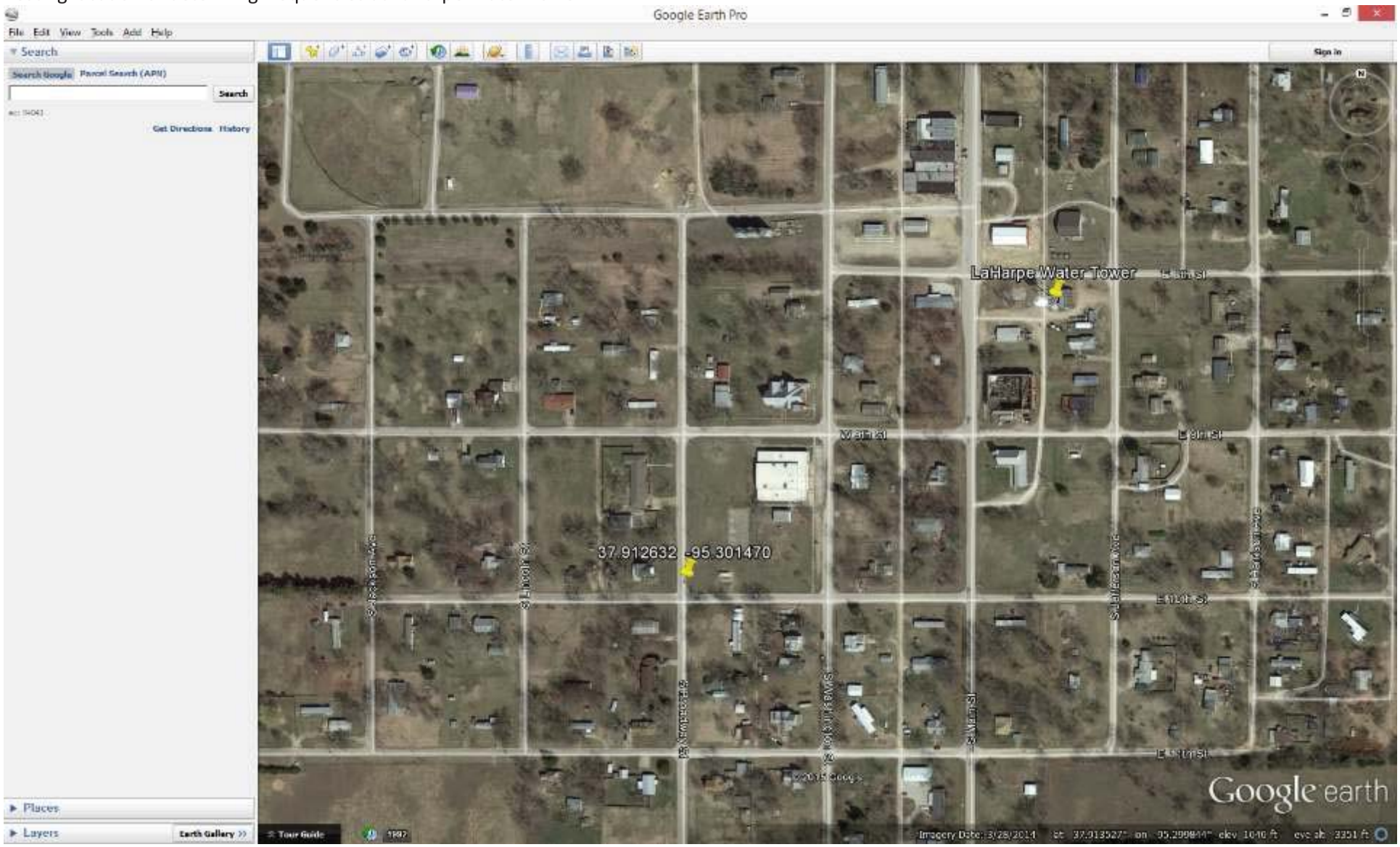
- 5.8GHz: 340 azimuth, 0 downtilt
- 2.4GHz: 340 azimuth, 3 downtilt
- Dish: 290 azimuth looking toward Iola

East (all estimates)

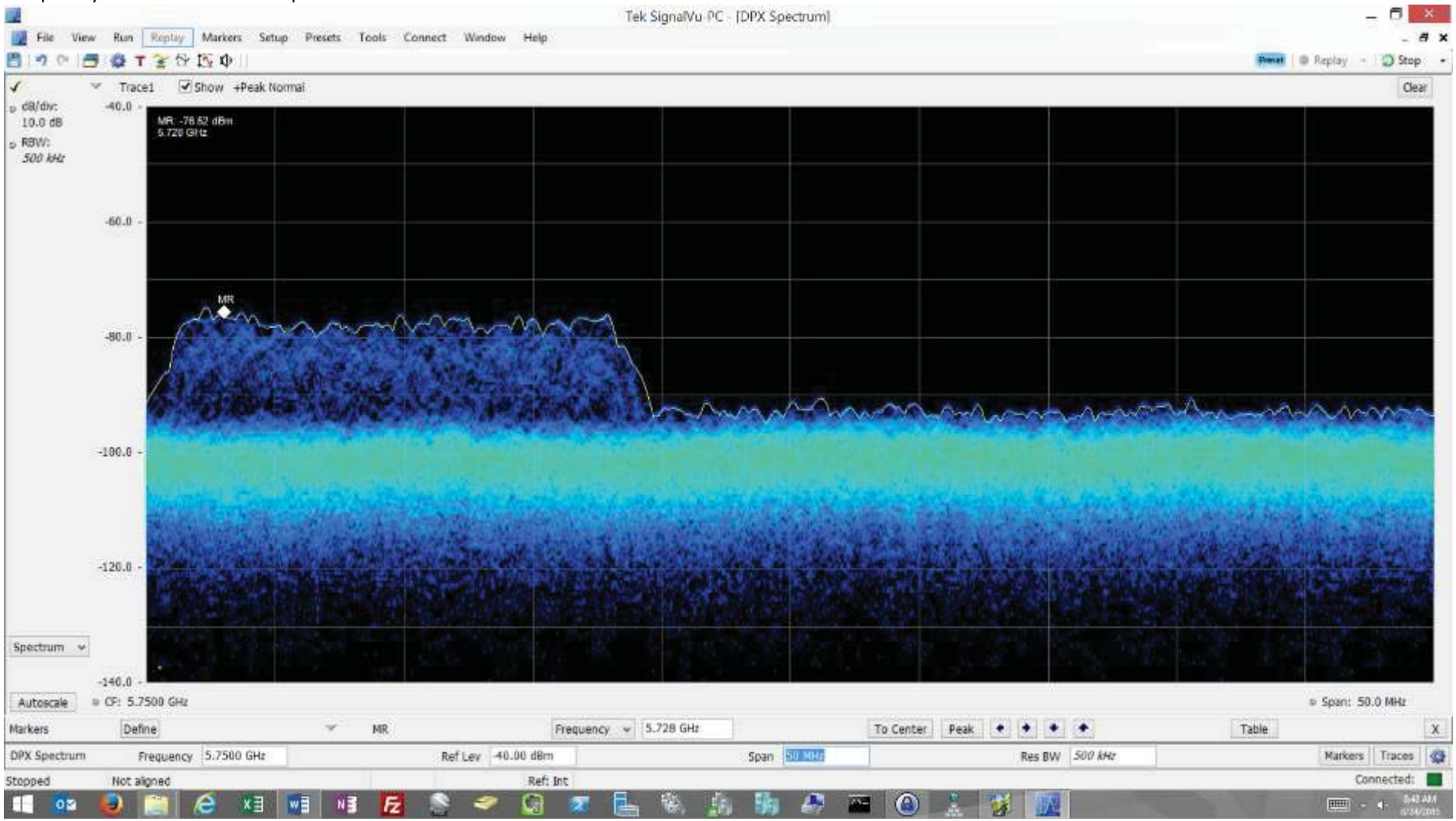
- 5.8GHz: 100 azimuth, 0 downtilt
- 2.4GHz: 100 azimuth, 3 degrees downtilt
- Dish: 90 azimuth looking toward Moran

Pictures and information about transmit (Tx) frequency and equipment mounted on LaHarpe water tower was supplied by a certified tower climber. These pictures were used as a reference for looking at other sites; knowing what each sector antenna looks like at each frequency was helpful for testing.

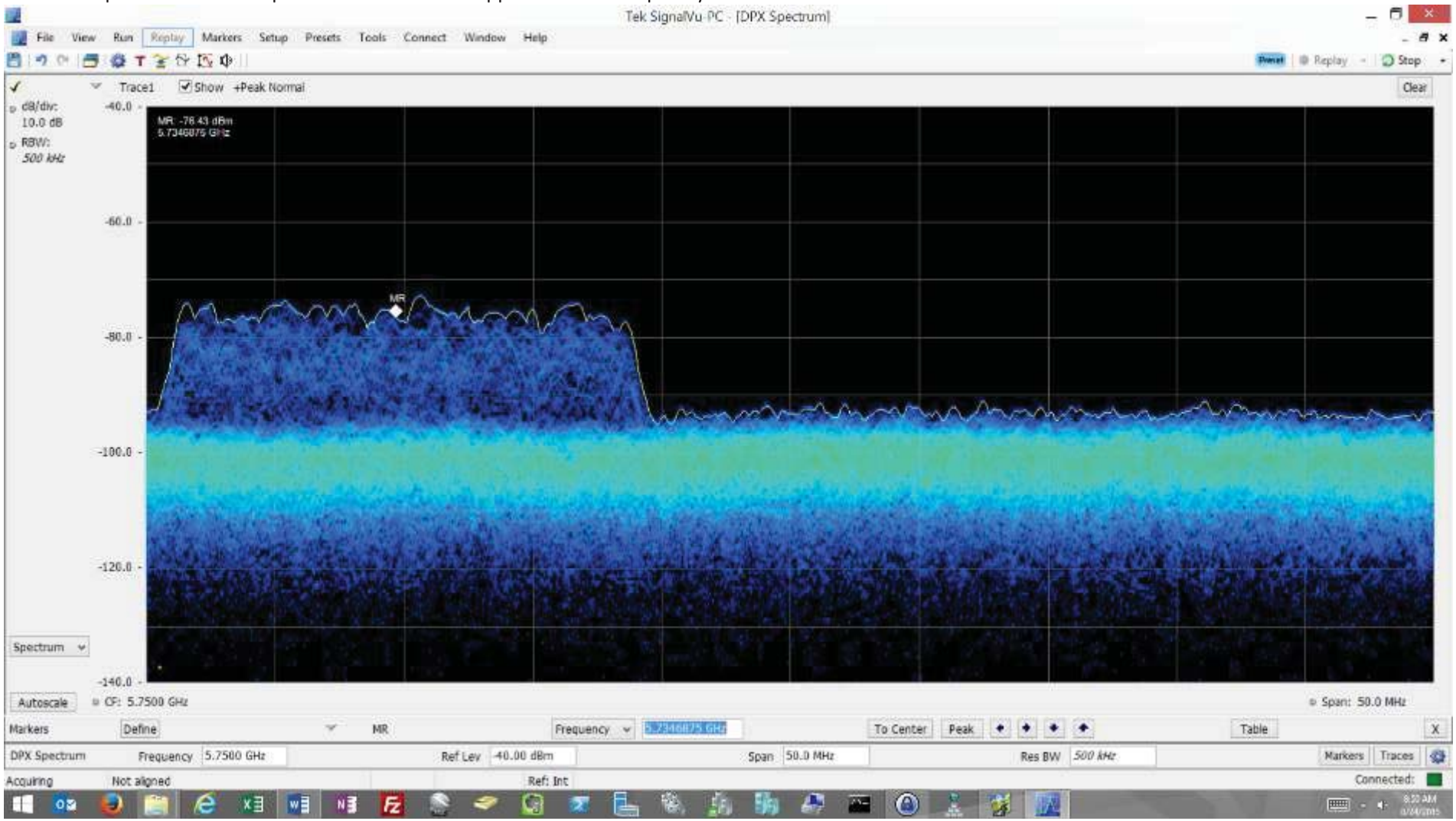
Testing location of determing frequencies at LaHarpe Water Tower



Frequency received from LaHarpe Water Tower SW sector



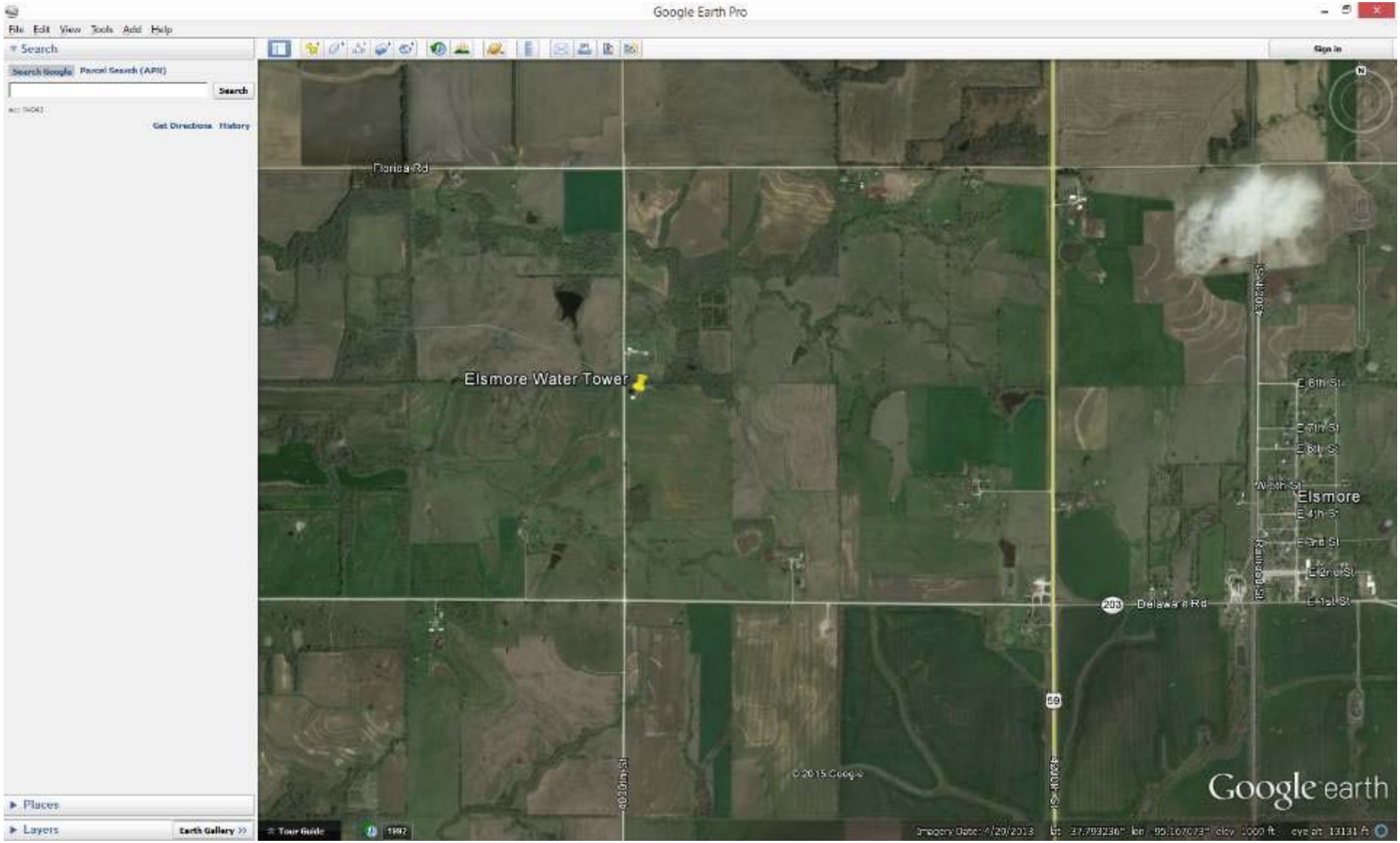
Another capture of the LaHarpe SW sector to show approx. center frequency



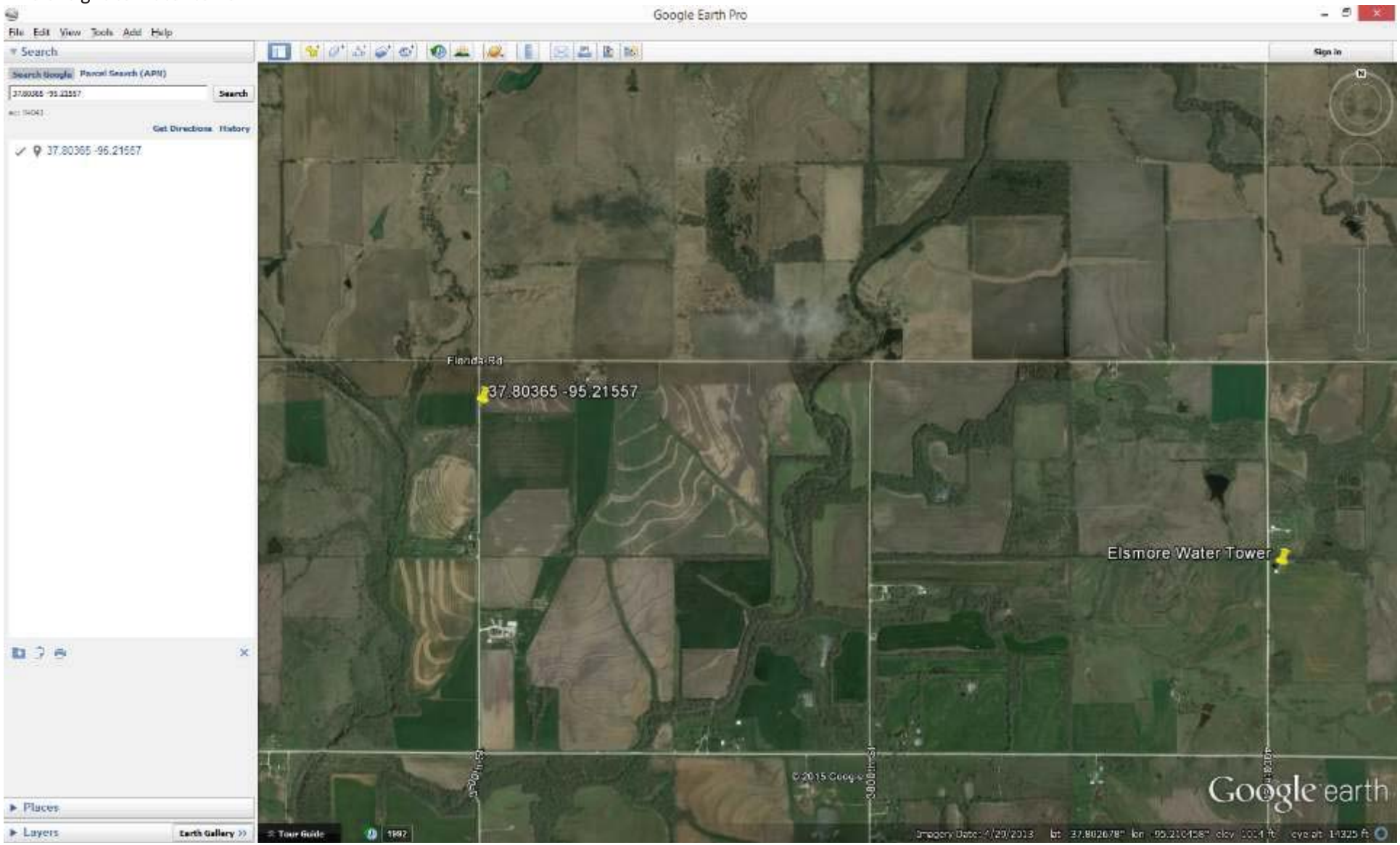
Elsmore Water Tower
37.797691 -95.178284
Approx. 150’ to rail

NW Sector pointing toward LaHarpe exchange

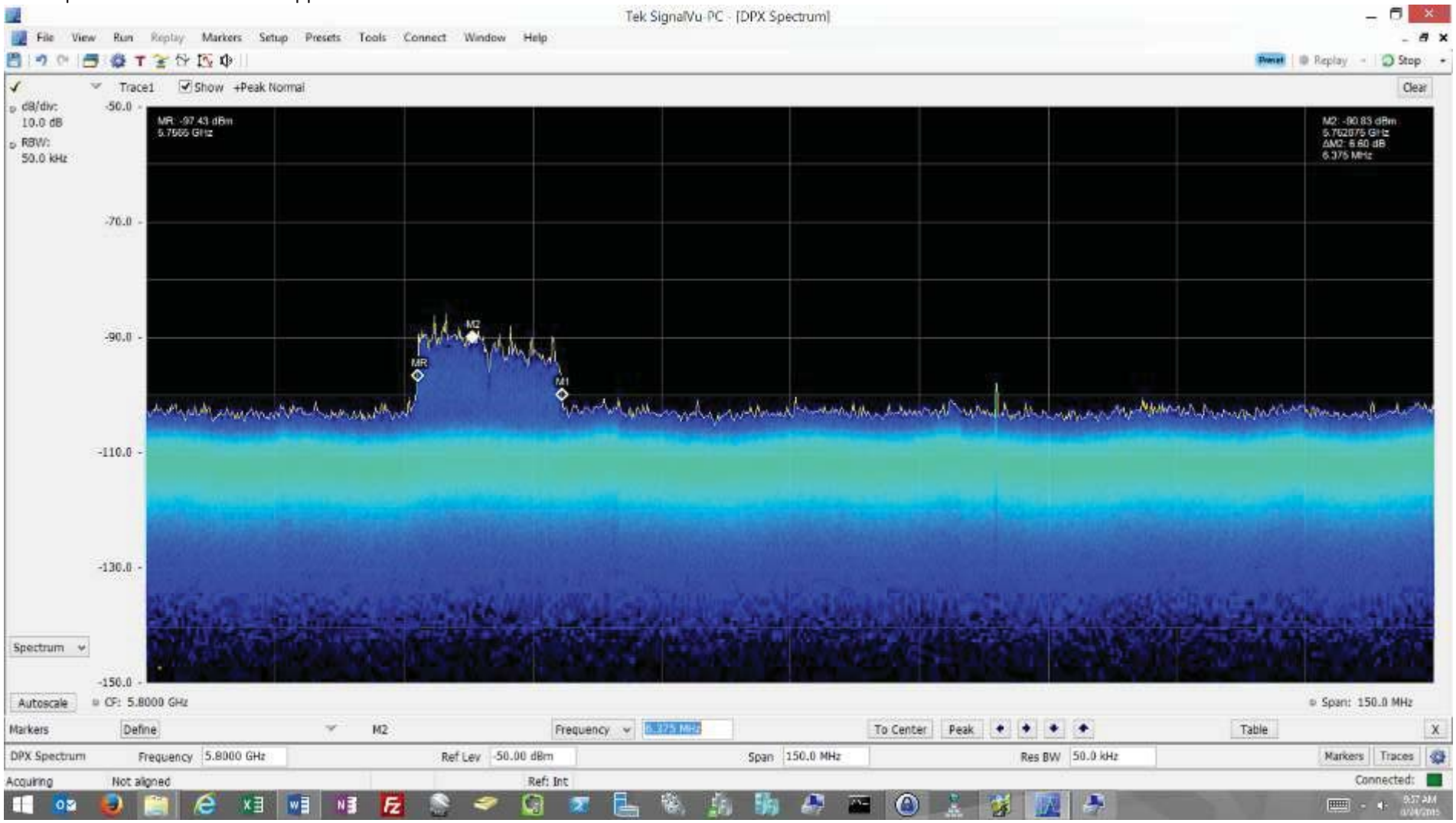
Location of Elmore Water Tower



Signal verification test location of Elsmore Water Tower
Line of sight to water tower



TX freq. 5.765 20MHz channel approx. -90dbm at test location

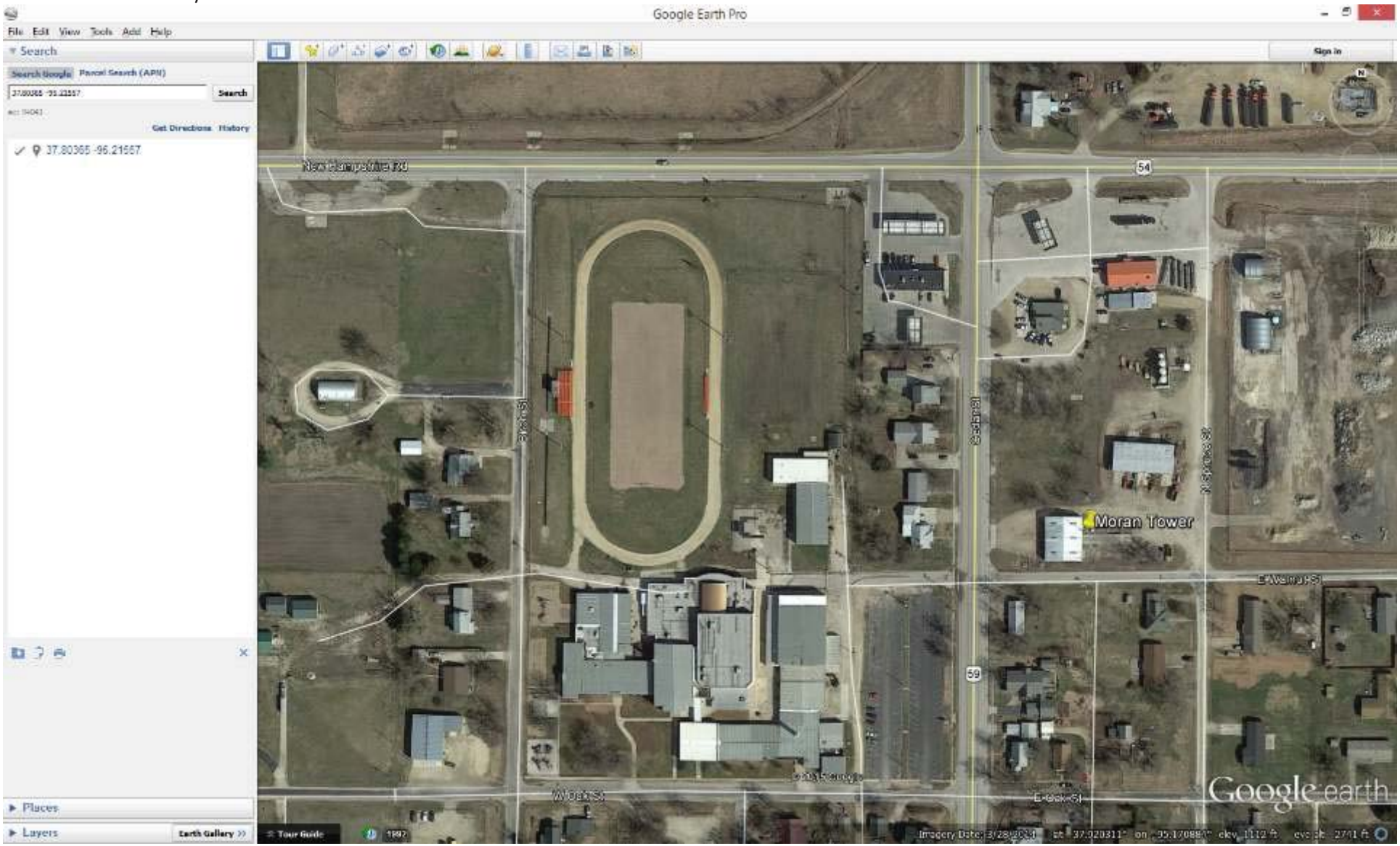


Moran Guyed Tower
37.919950 -95.169404
130’ to sector centerlines
3 sector on tower approx. 0, 120,240

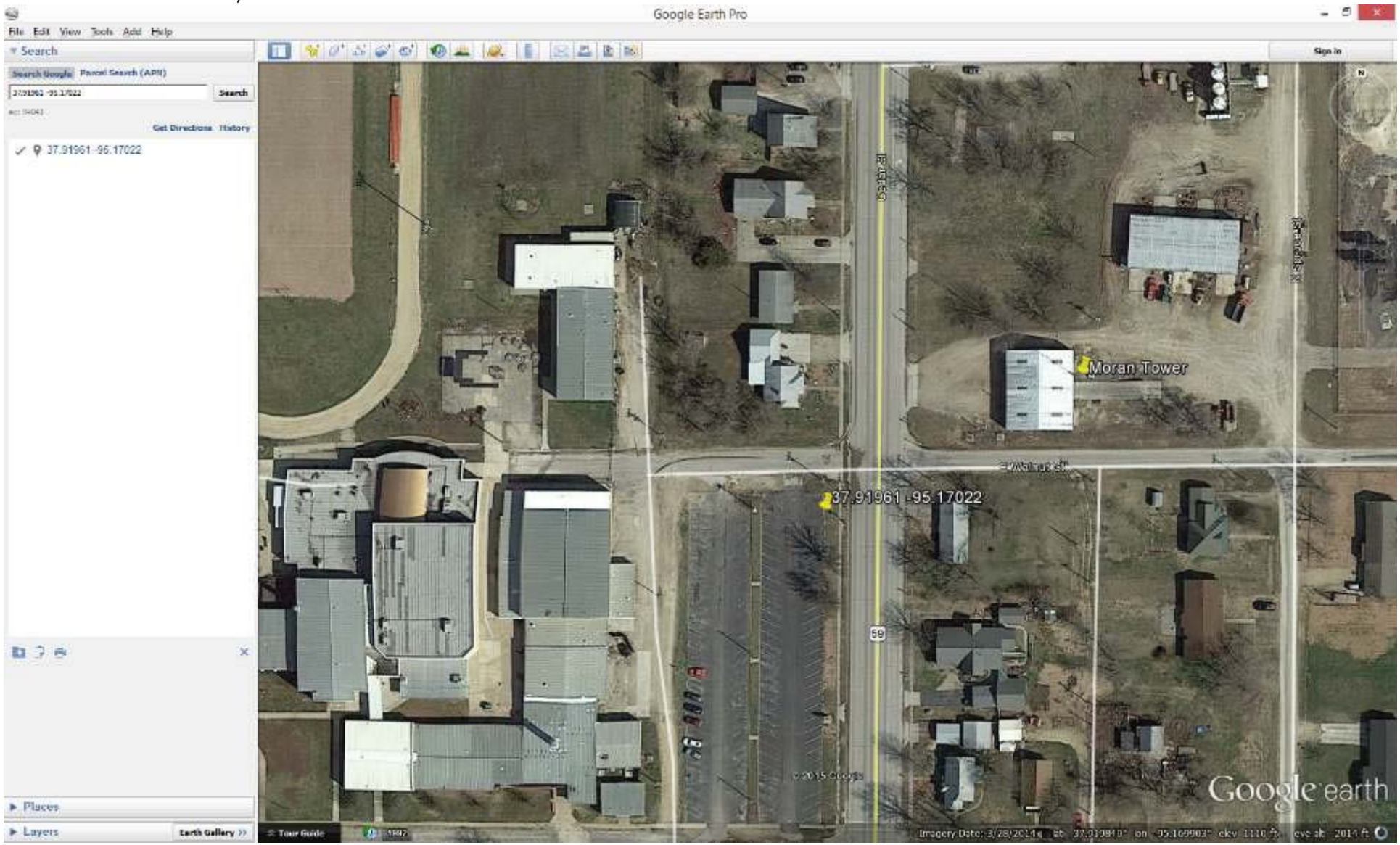
A few dishes can be seen on tower.

Small box mounted near the bottom of the tower identical to box at LaHarpe Water Tower.

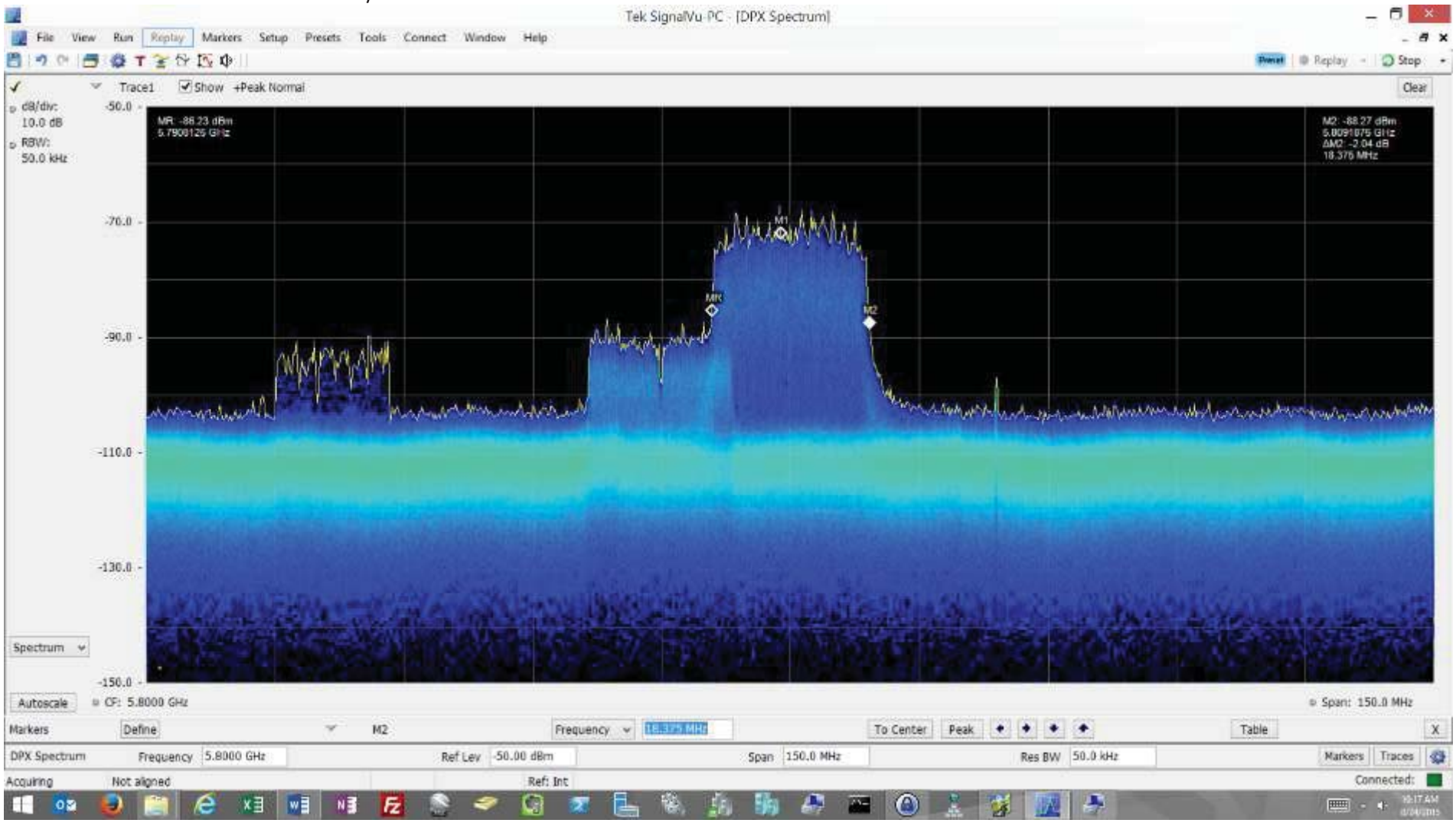
Location of Moran Guyed Tower



Test Location of Moran Guyed Tower



TX 5.81GHz 20MHz channel Moran Guyed Tower

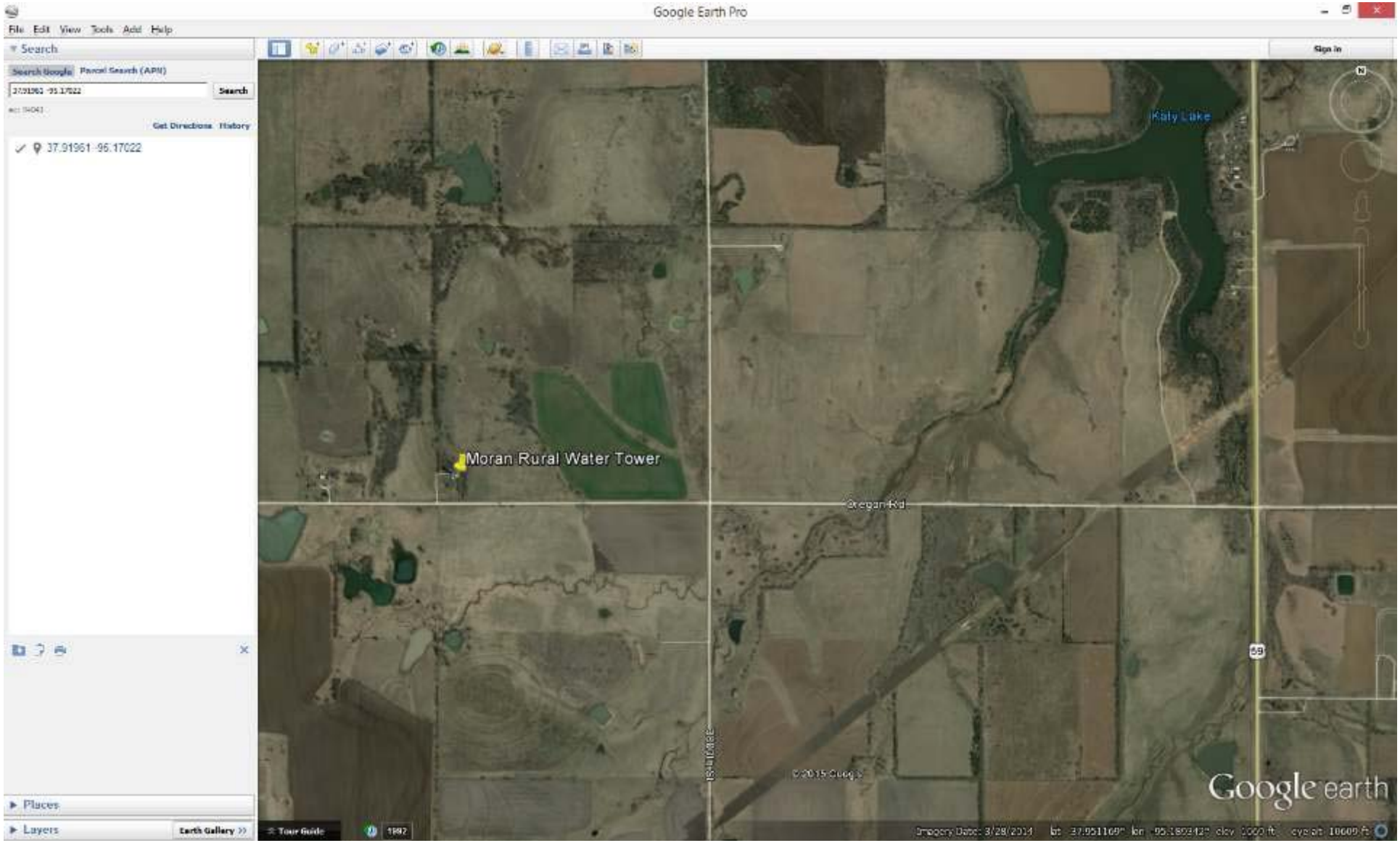


Moran Rural Water Tower
37.951127 -95.196469

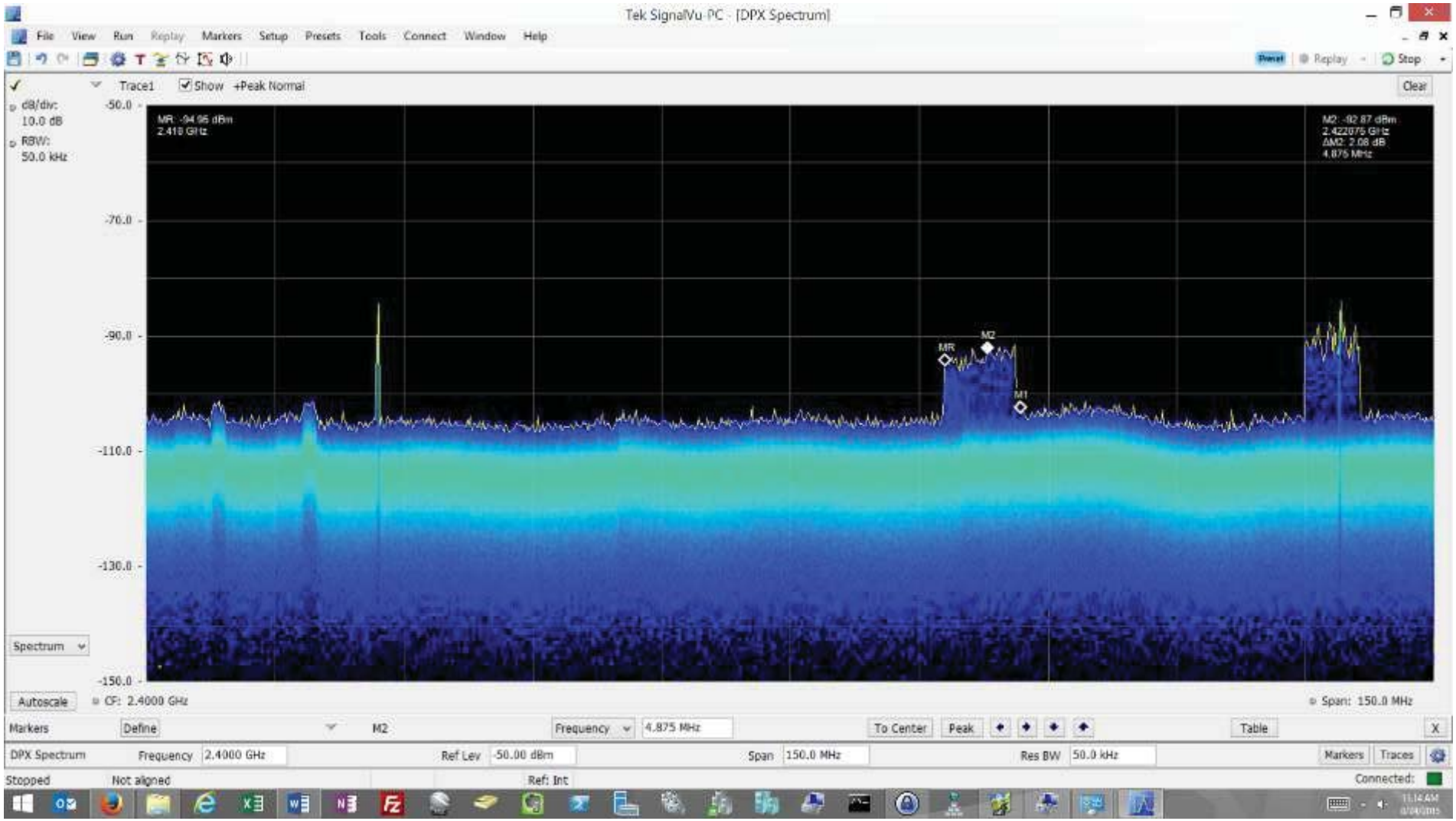
125’ to sector centerline
3 sector site mounted approx. 10’ above top of water tower
South sector: 170 degrees
NW sector: 300 degrees
NE sector: does not point toward LaHarpe exchange

KwiKom appears to be using 2.4GHz at this location for serving customers. Signal found at 5.5GHz from Moran Rural Water Tower

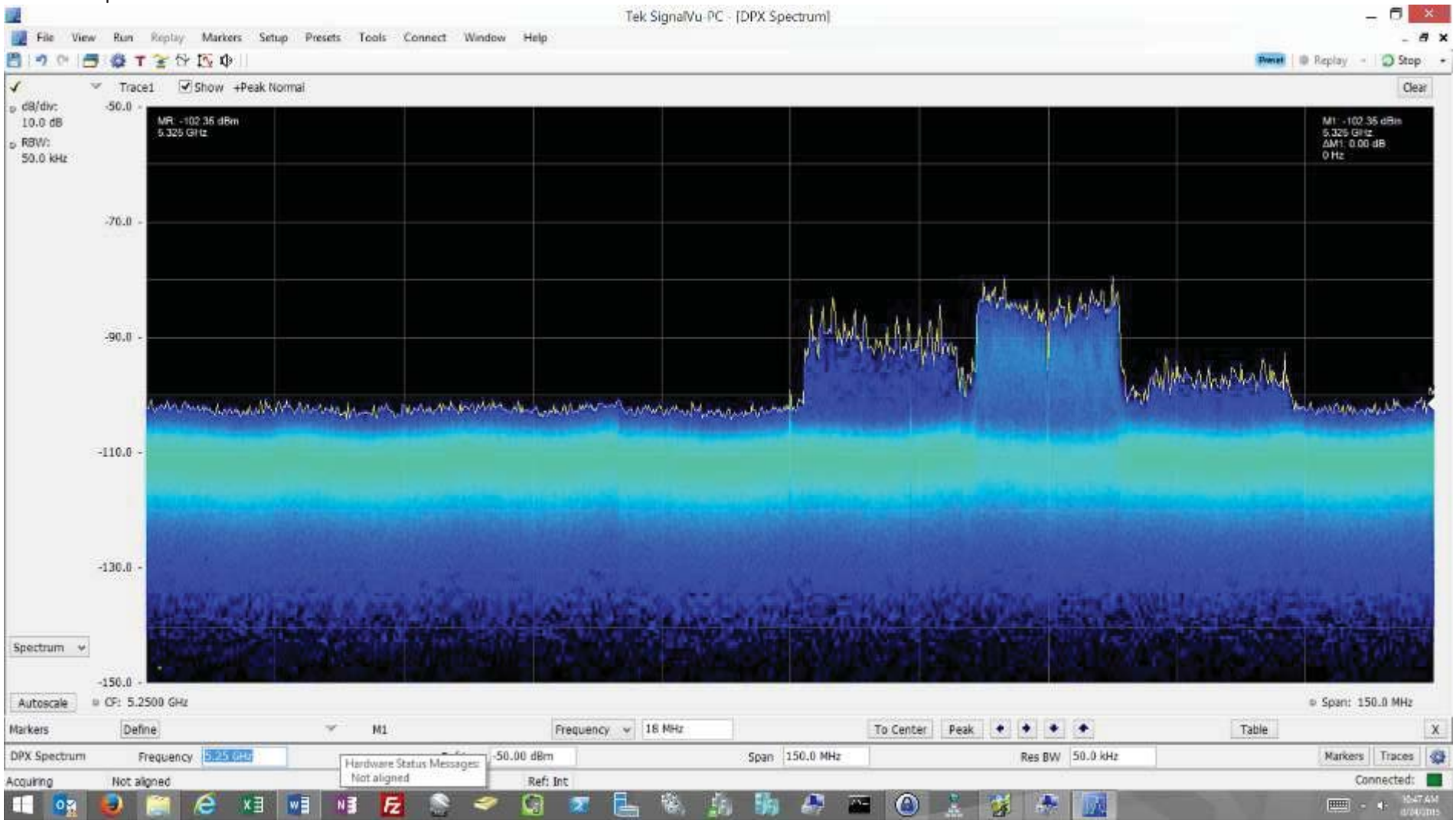
Location of Moran Rural Water Tower



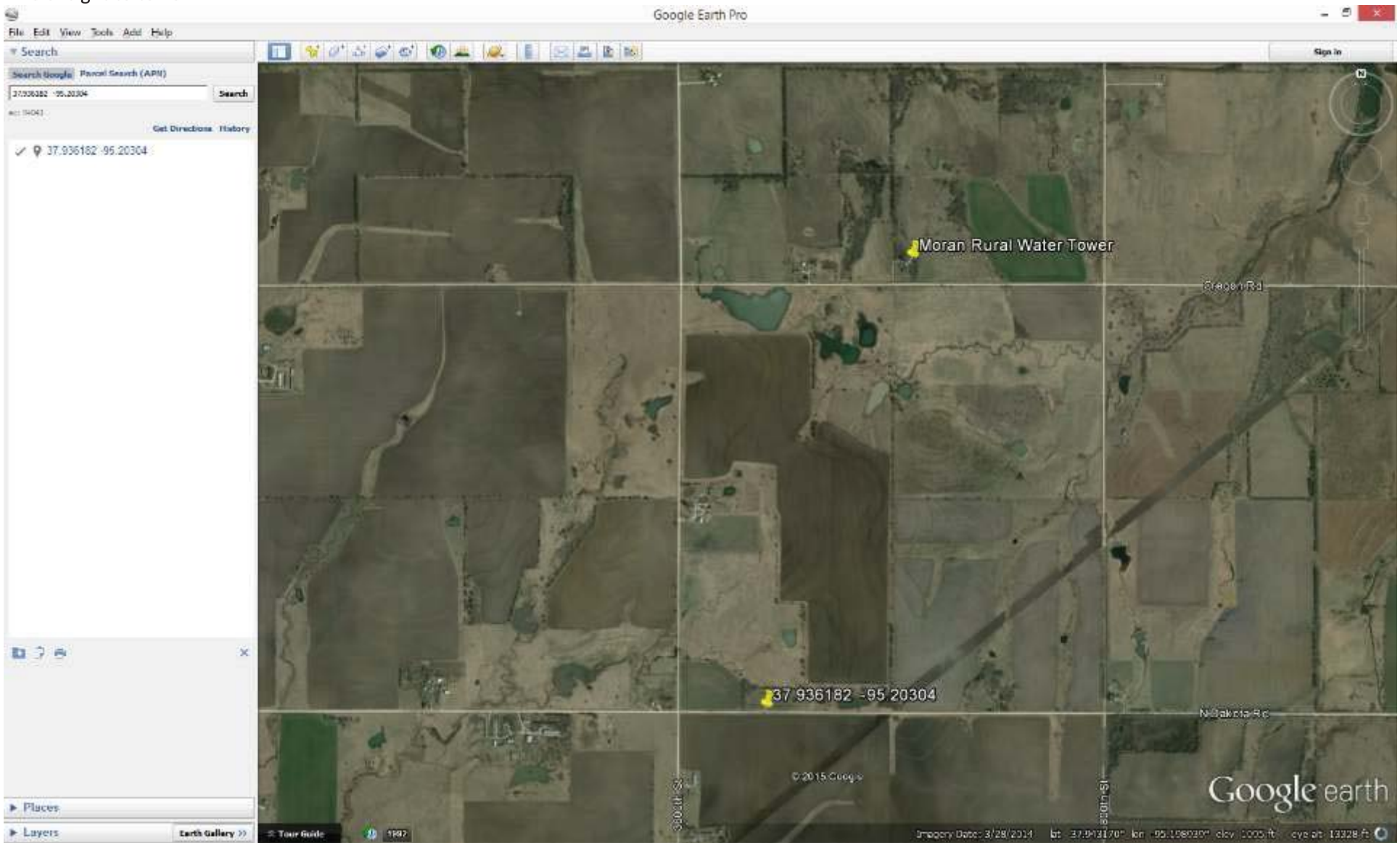
NW sector TX 2.422GHz 10MHz channel Moran Rural Water Tower



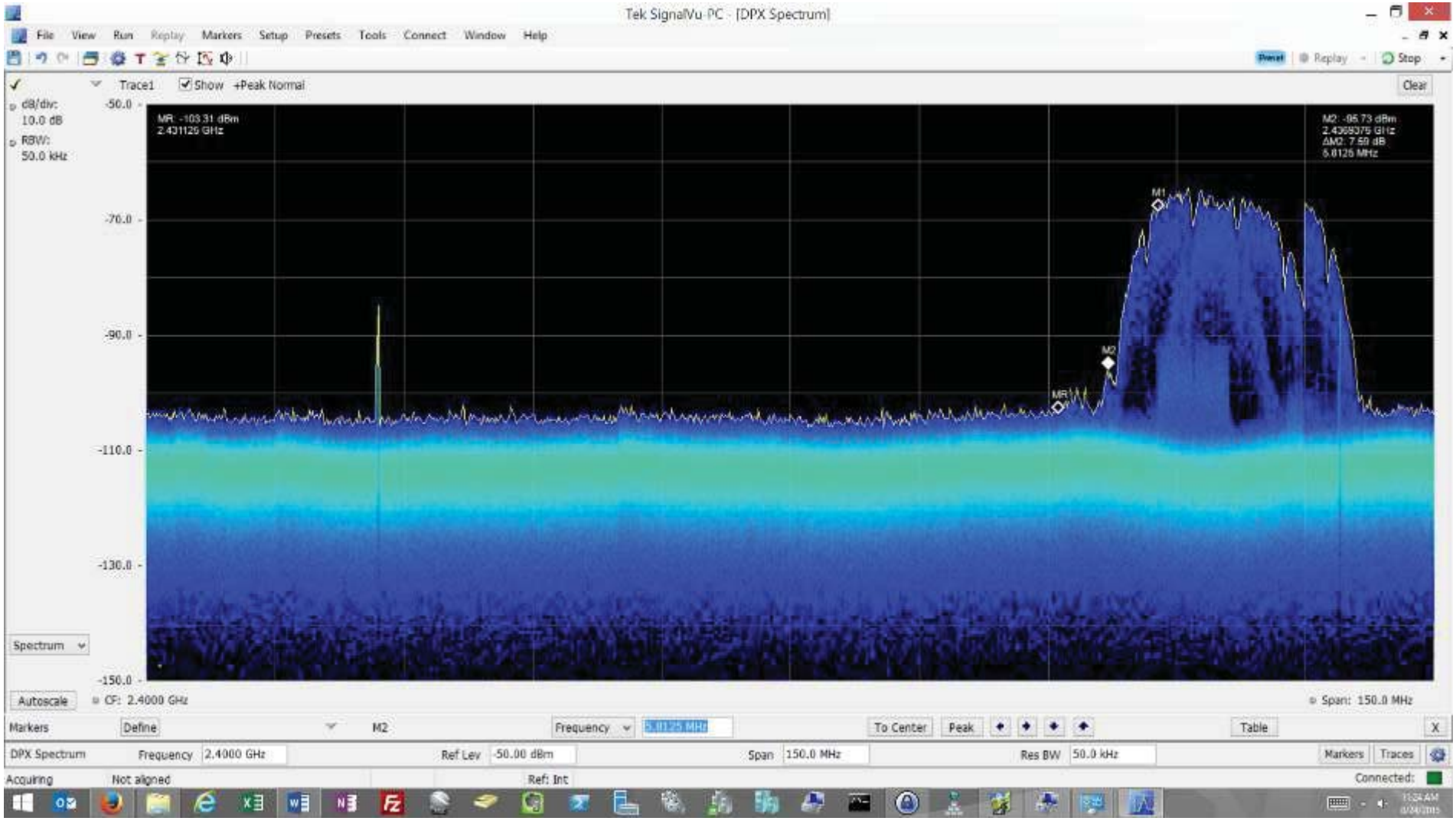
Another capture of Moran Rural Water tower NW sector



Approx. test of location of south sector on Moran Rural Water tower
Line of sight to tower



South sector test results from Moran Rural Water Tower

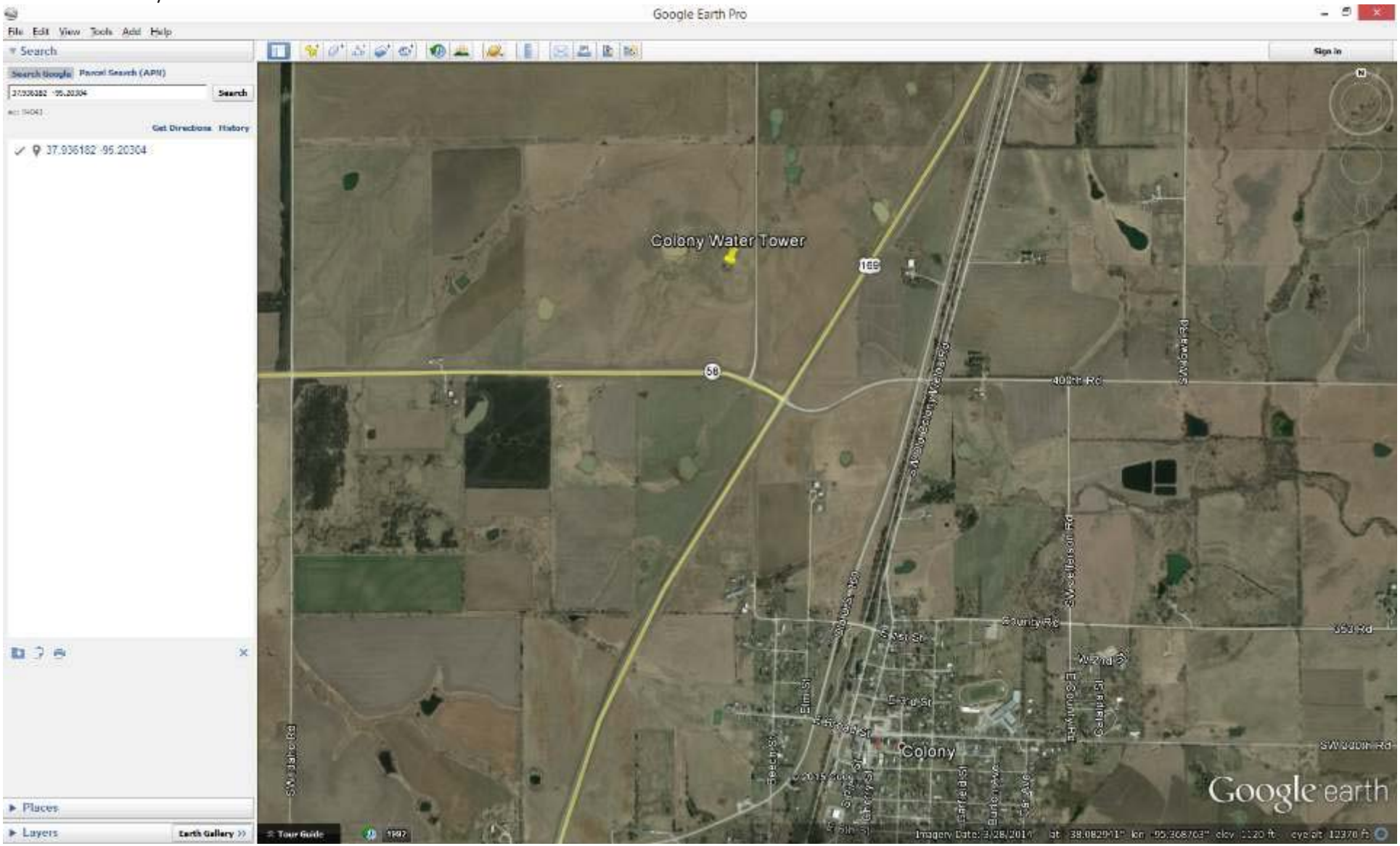


Colony Water Tower
38.085711 -95.372459

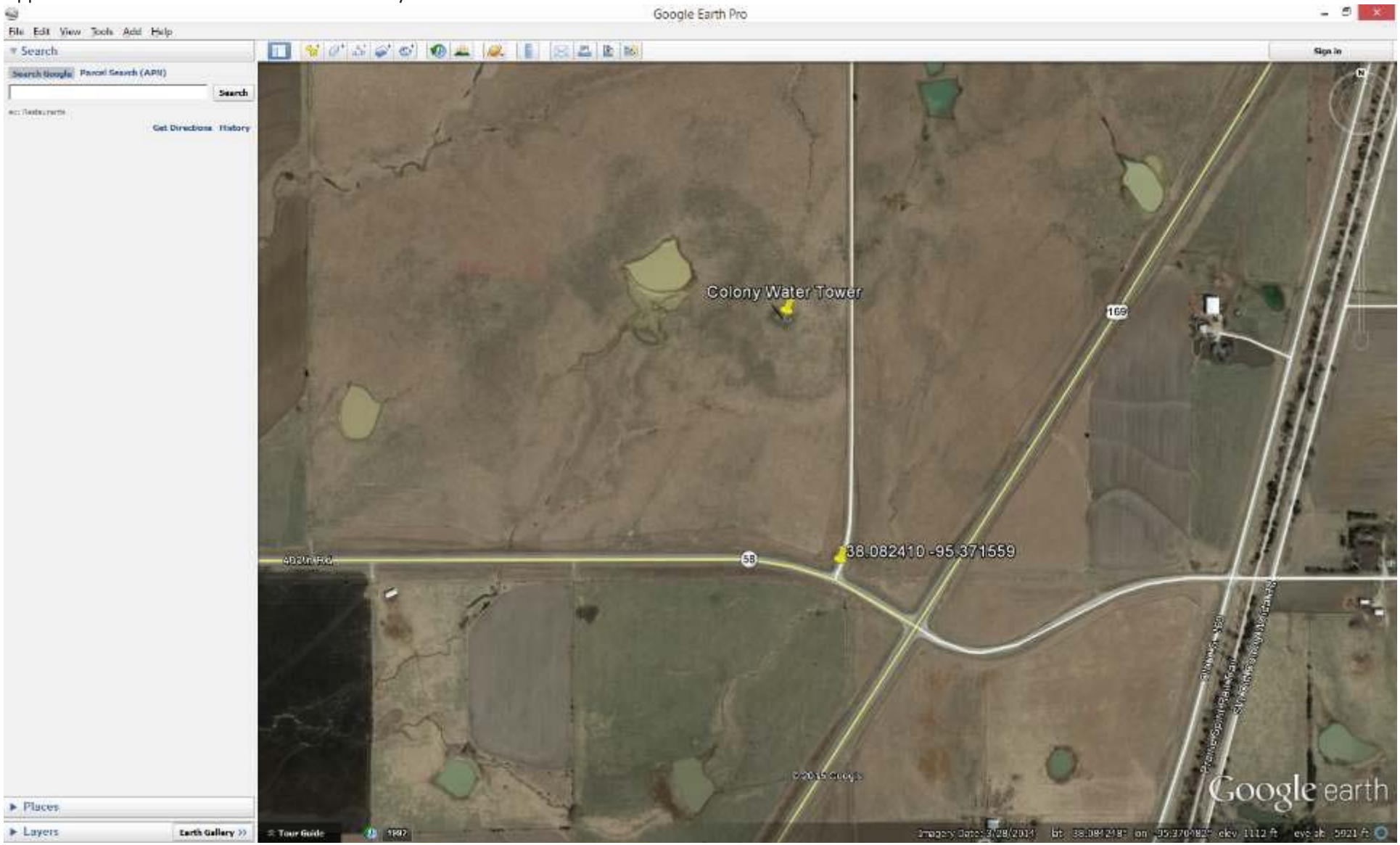
100’ centerline

2 sector site approx. 170 degrees and 10 degree azimuths

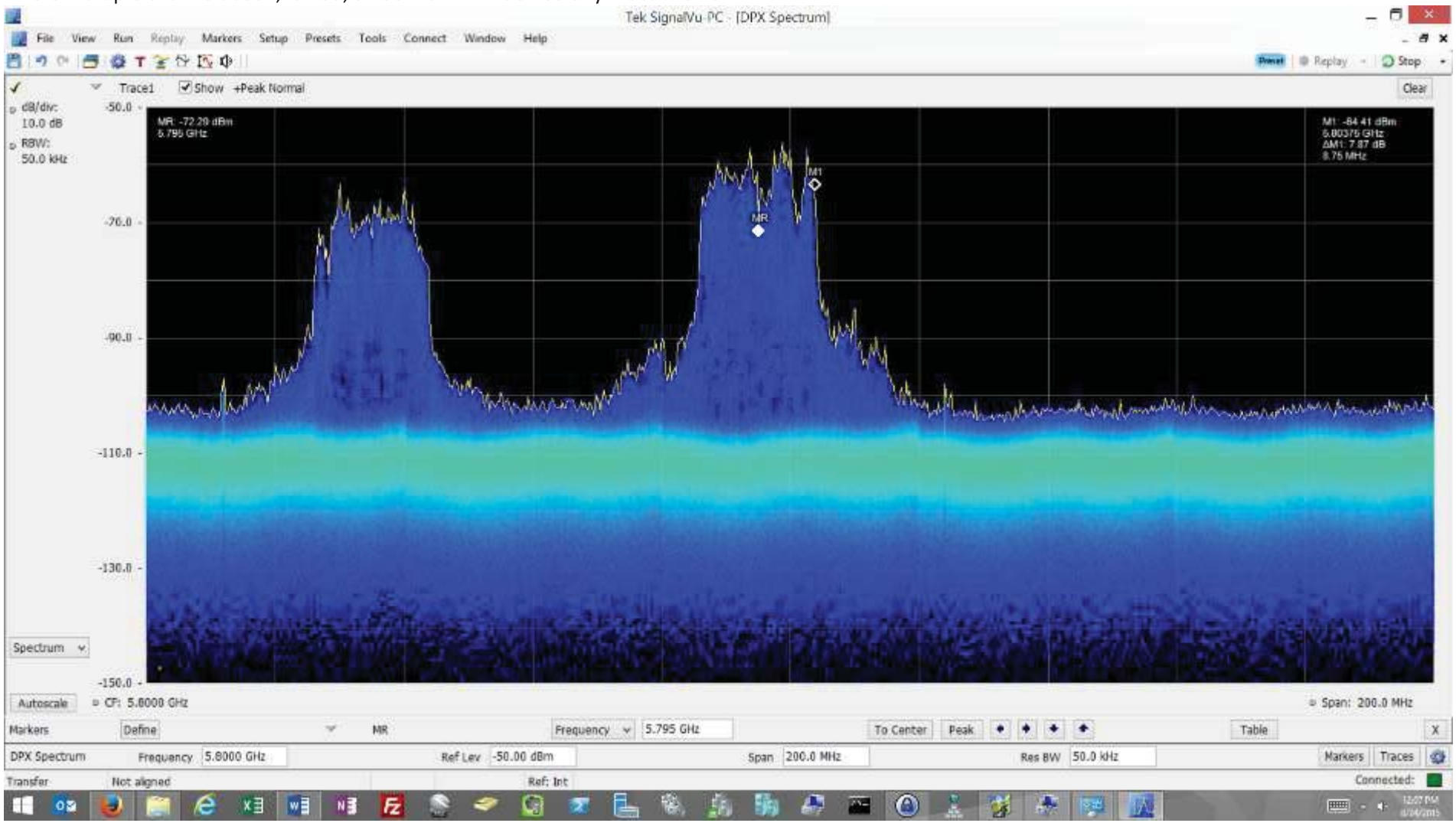
Location of Colony Water Tower



Approx. test location of south sector of Colony Water Tower



TX 5.8 multiple channels seen; 5.735, 5.795 20mhz wide Colony Water Tower



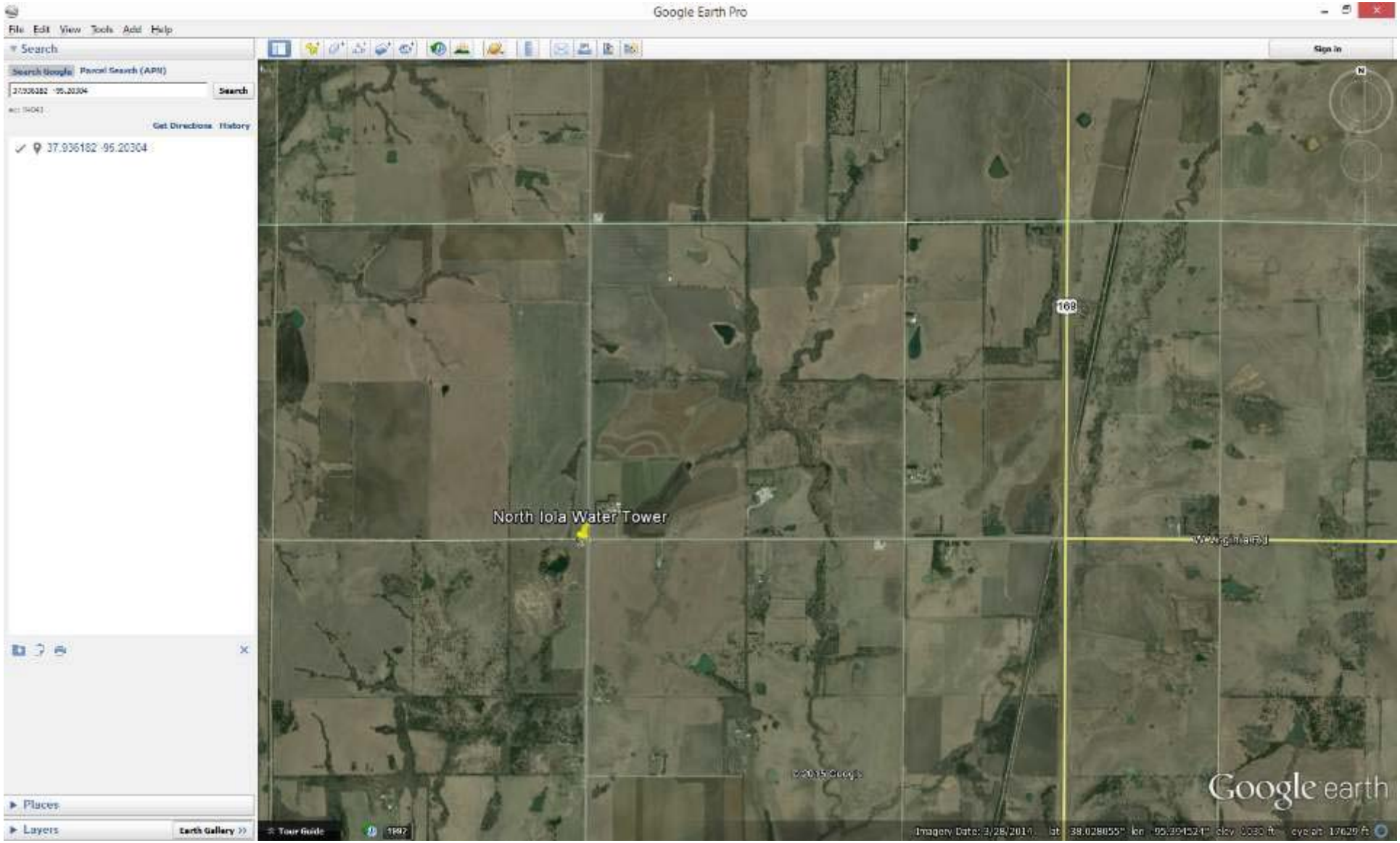
North Iola Water Tower
38.023705 -95.408973

125’ to rail

2.4GHz being used on tower. Verified by going south down road and finding CPE mounted on short poles near ROW pointing back toward tower. CPE was NanoBridge M2.

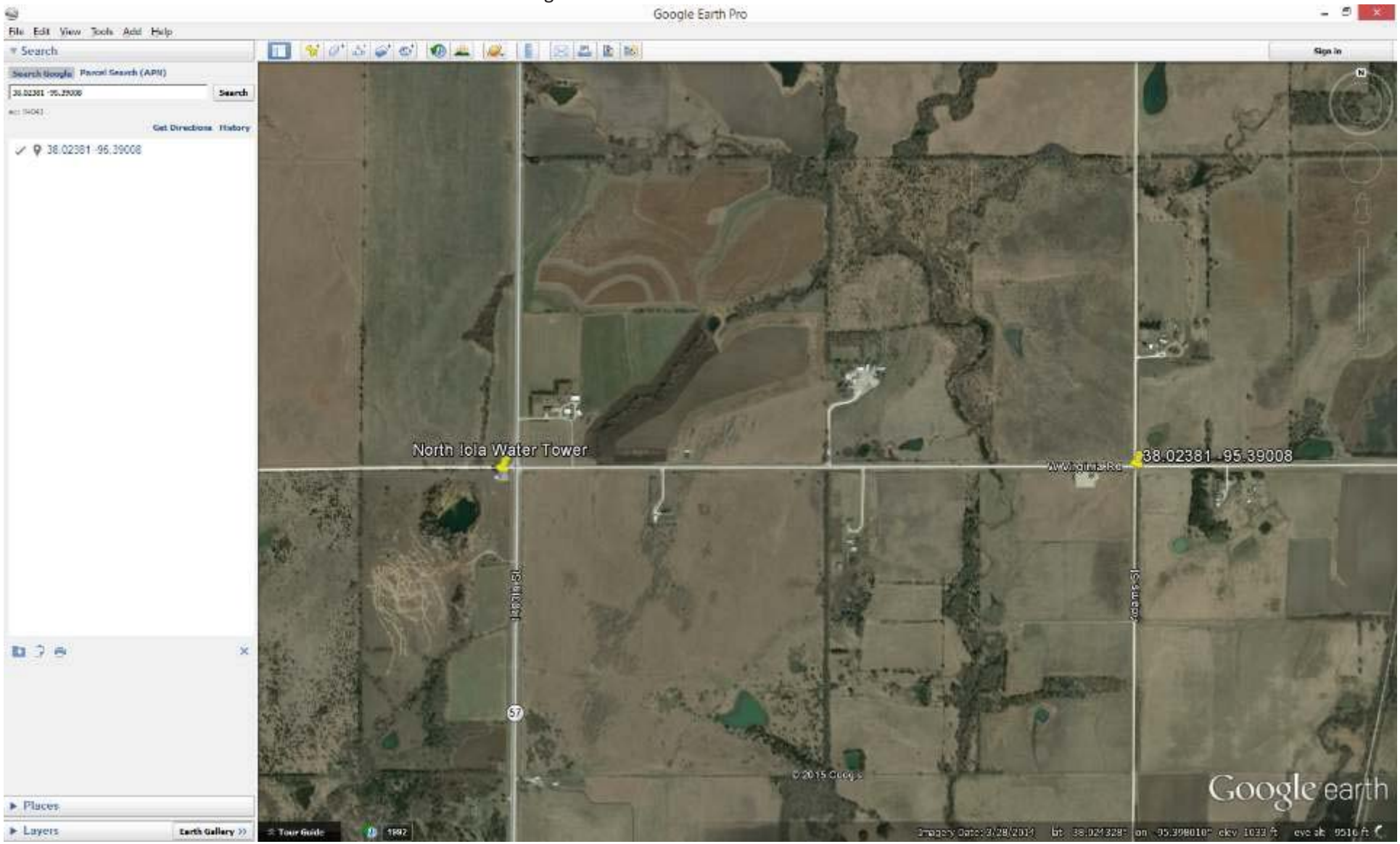
NE sector approx. 60 degrees
SE sector approx. 120 degrees

Location of North Iola Water Tower

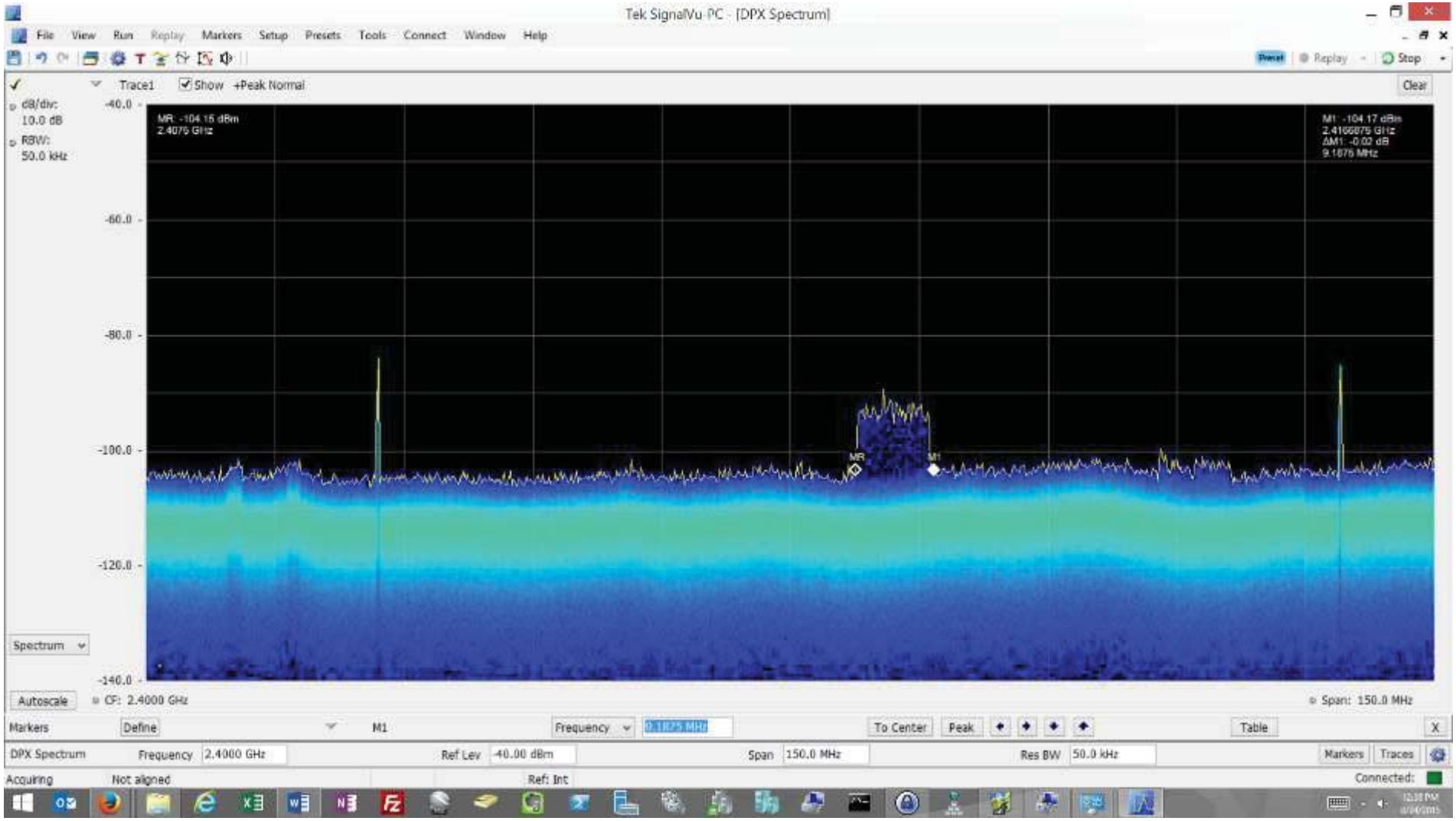


NE sector approx. 75 degrees

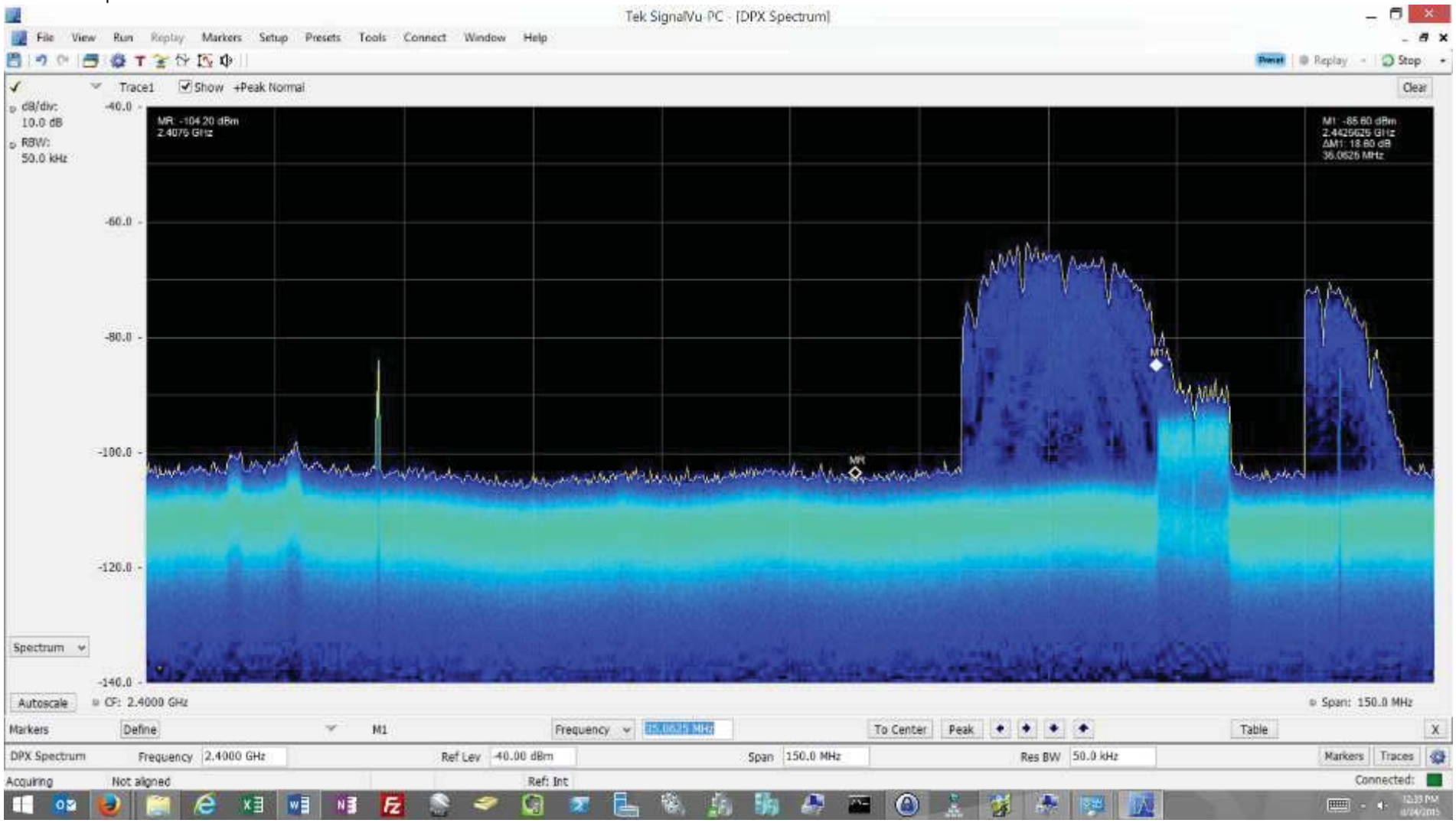
Test location of NE sector of North Iola water tower – line of sight to water tower



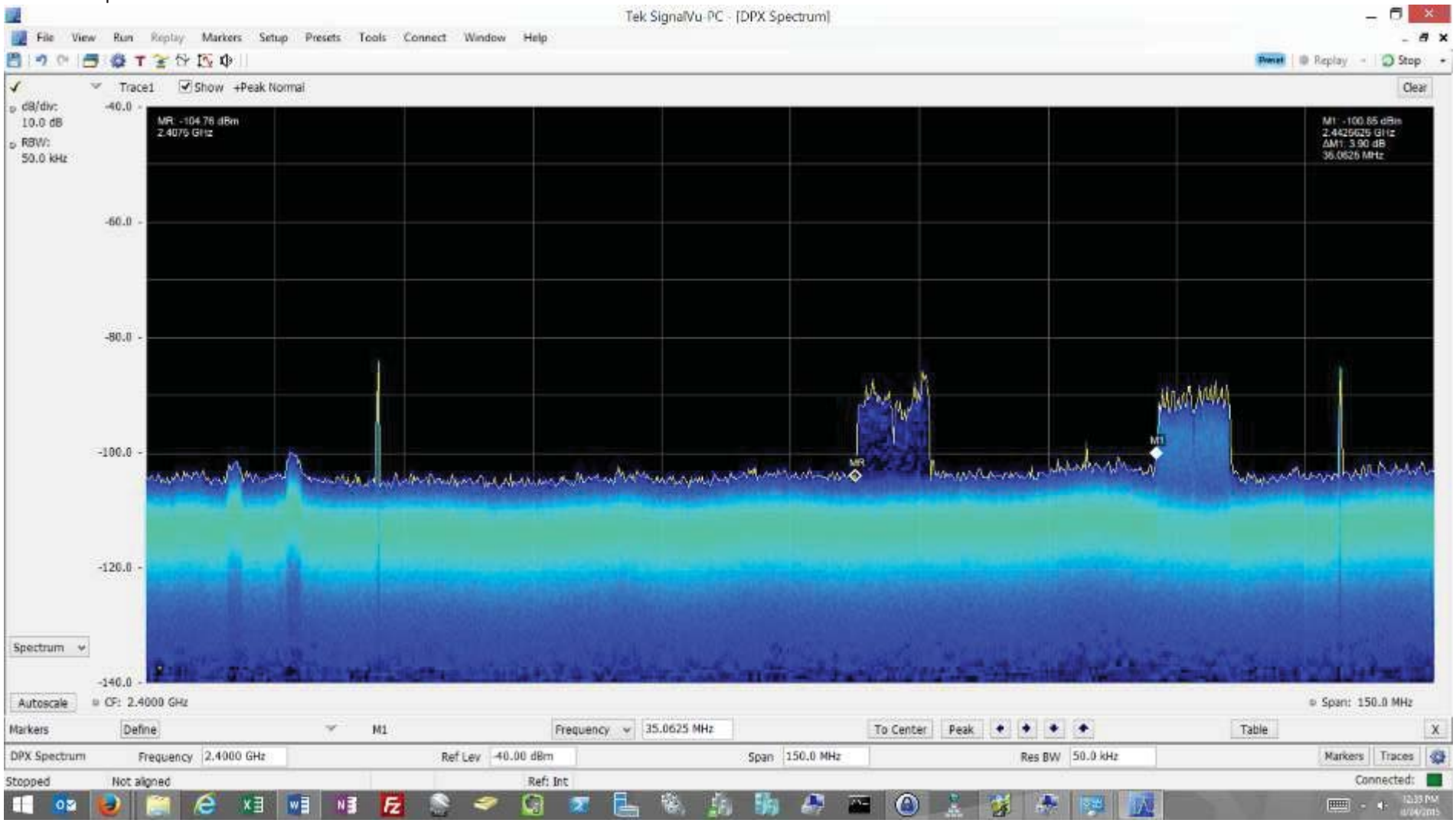
Screenshot of NE sector of North Iola water tower



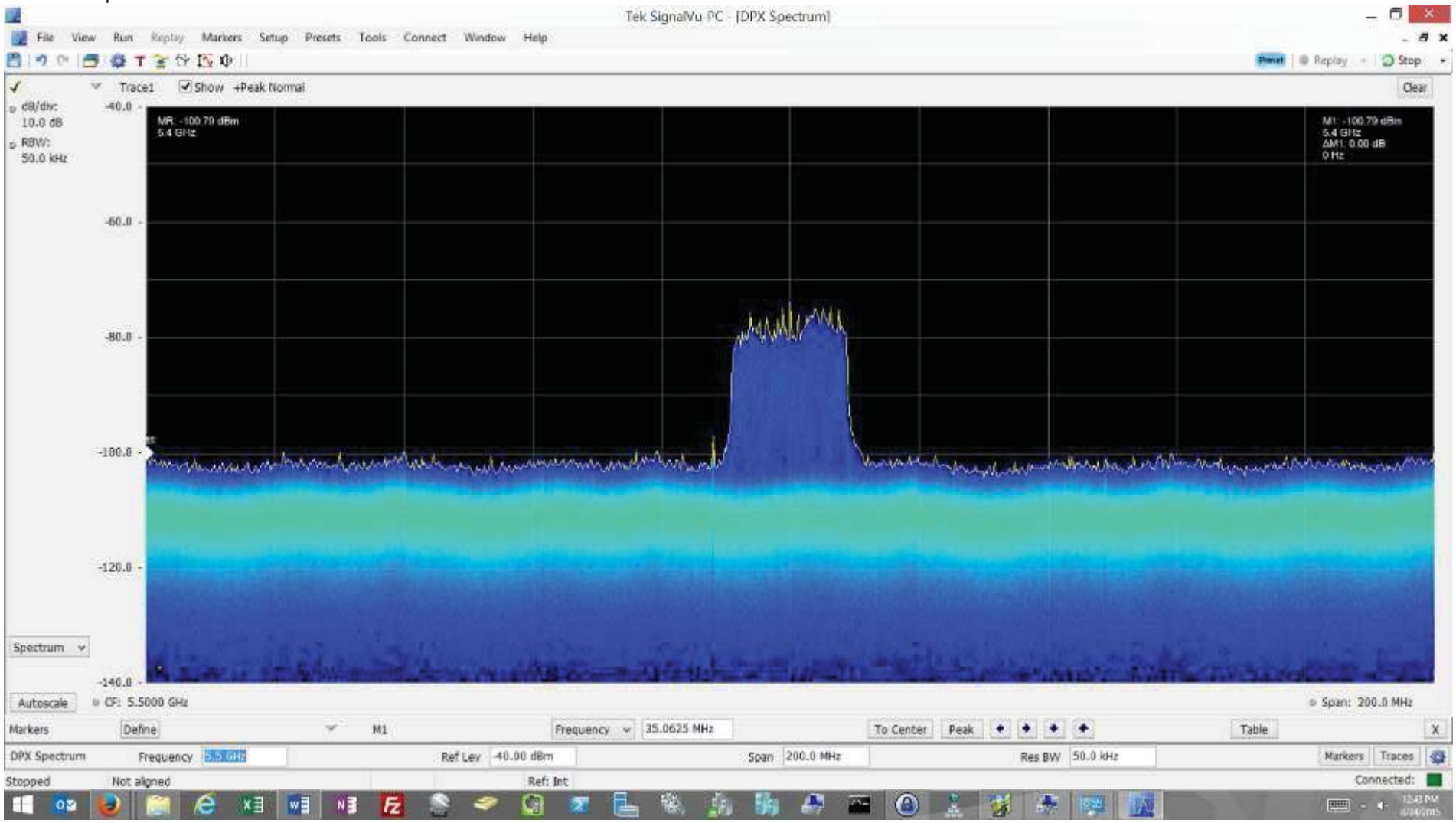
Another capture of NE sector of North Iola water tower



Another capture of NE sector of North Iola water tower

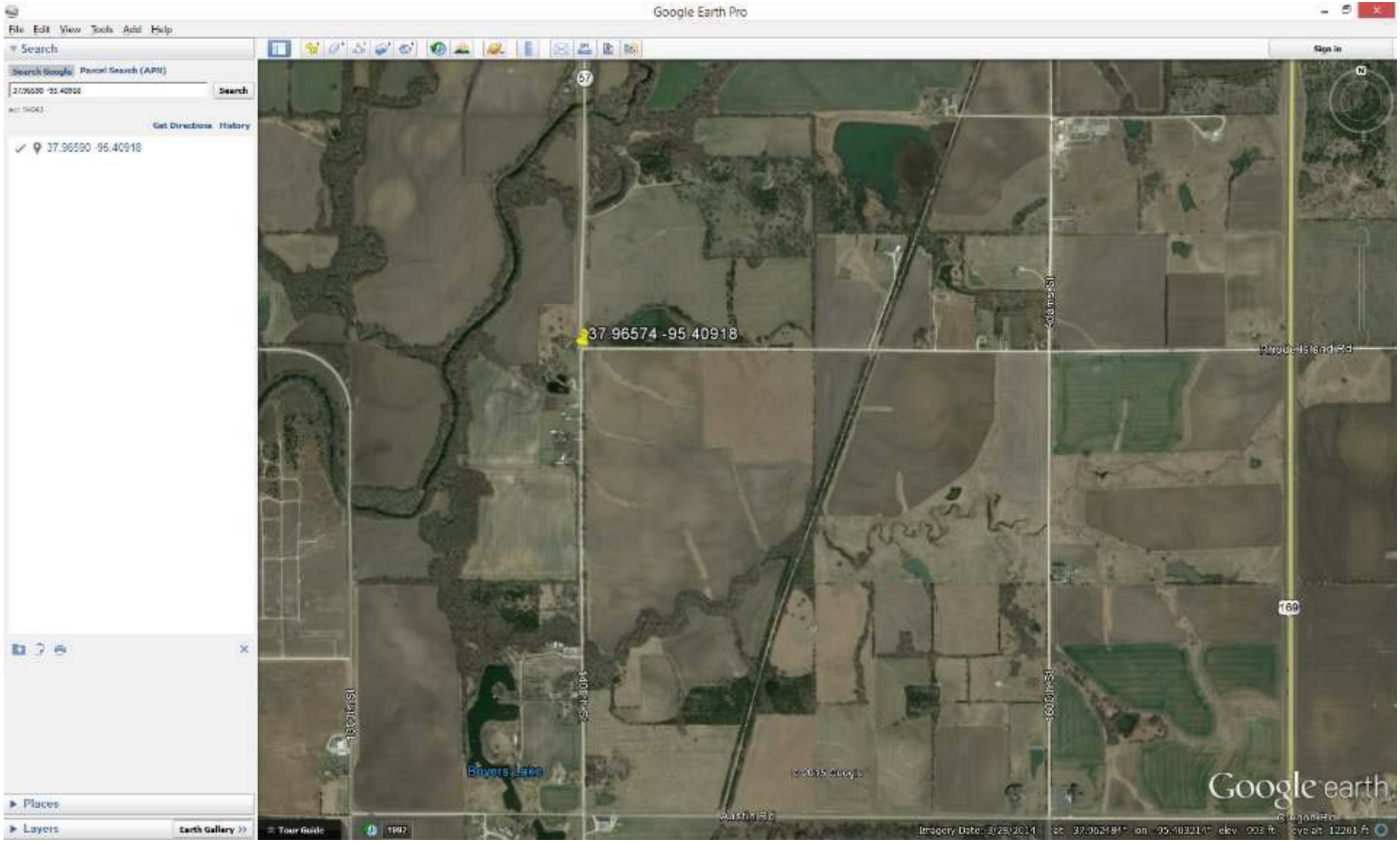


Another capture of NE sector of North Iola water tower



KwiKom Customer Location

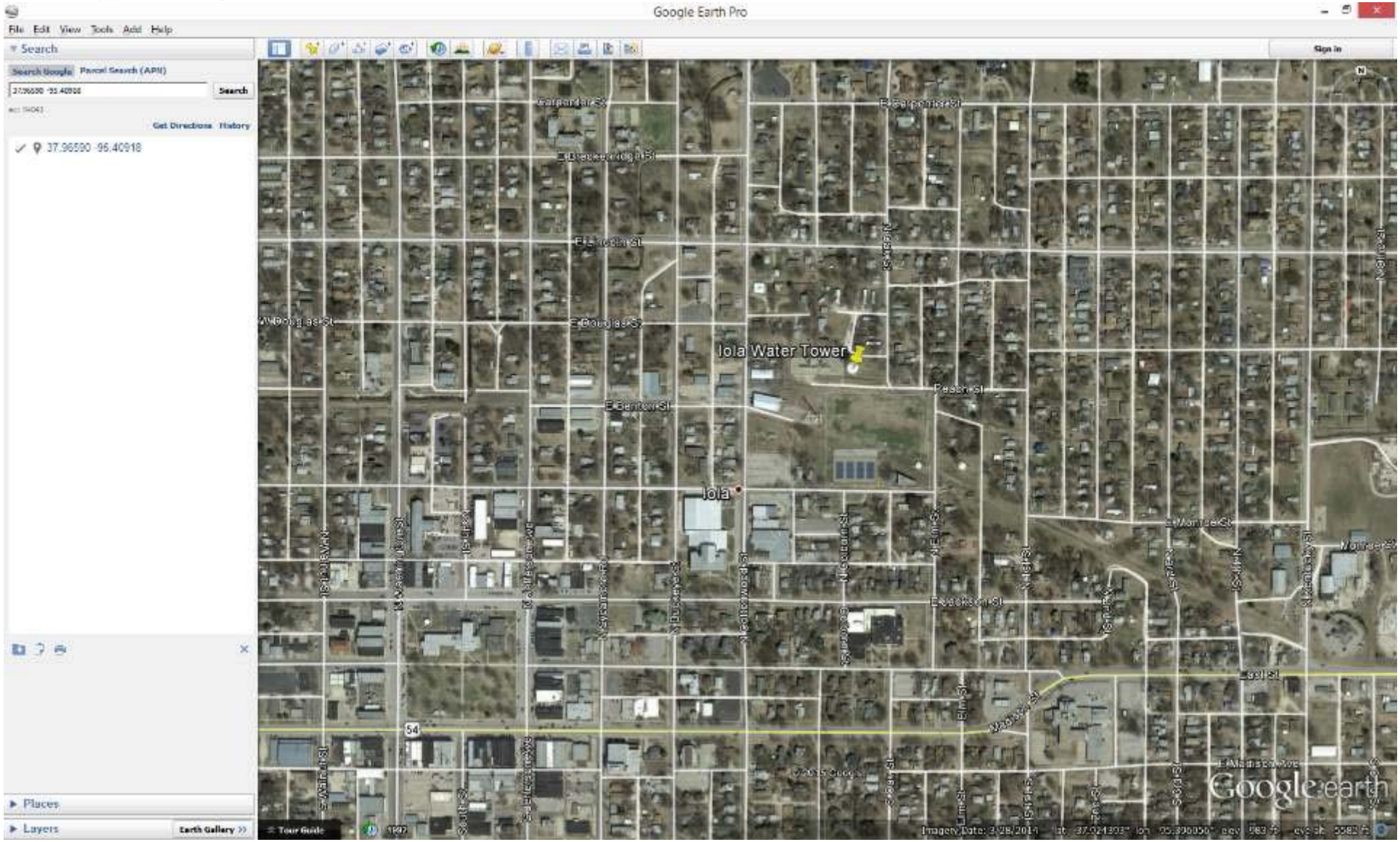
2.4GHz Nanobridge M2; Pictures were taken of the Ubiquiti NanoBridge M2 used to serve customer. This was one of many CPE equipment found along this road mounted on a pole 4-6ft. above the ground near the right-of-way pointing north toward North Iola Water tower. See picture 14 for more detail.



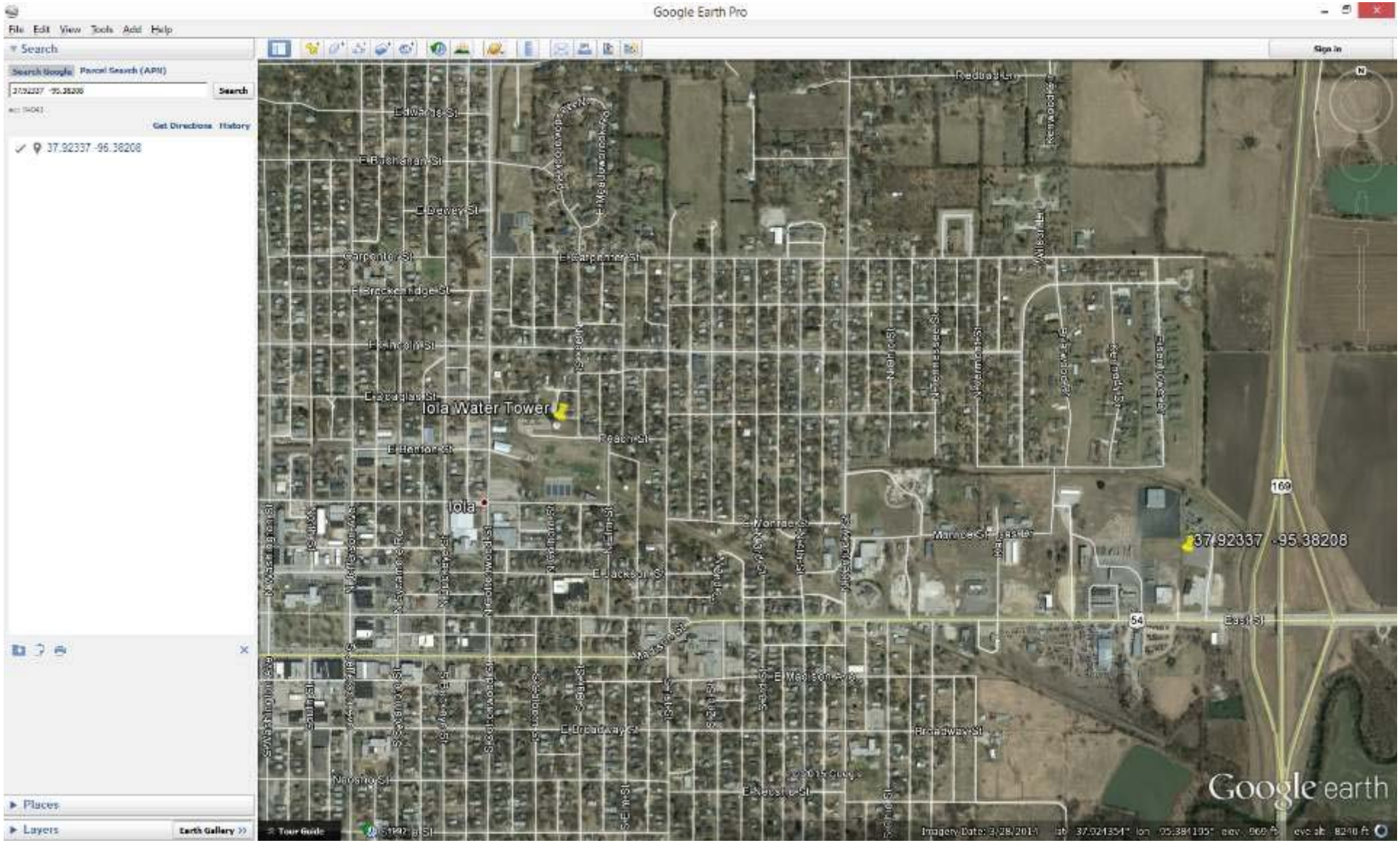
Iola Water Tower
37.926030 -95.398118

130’ to antenna centerline

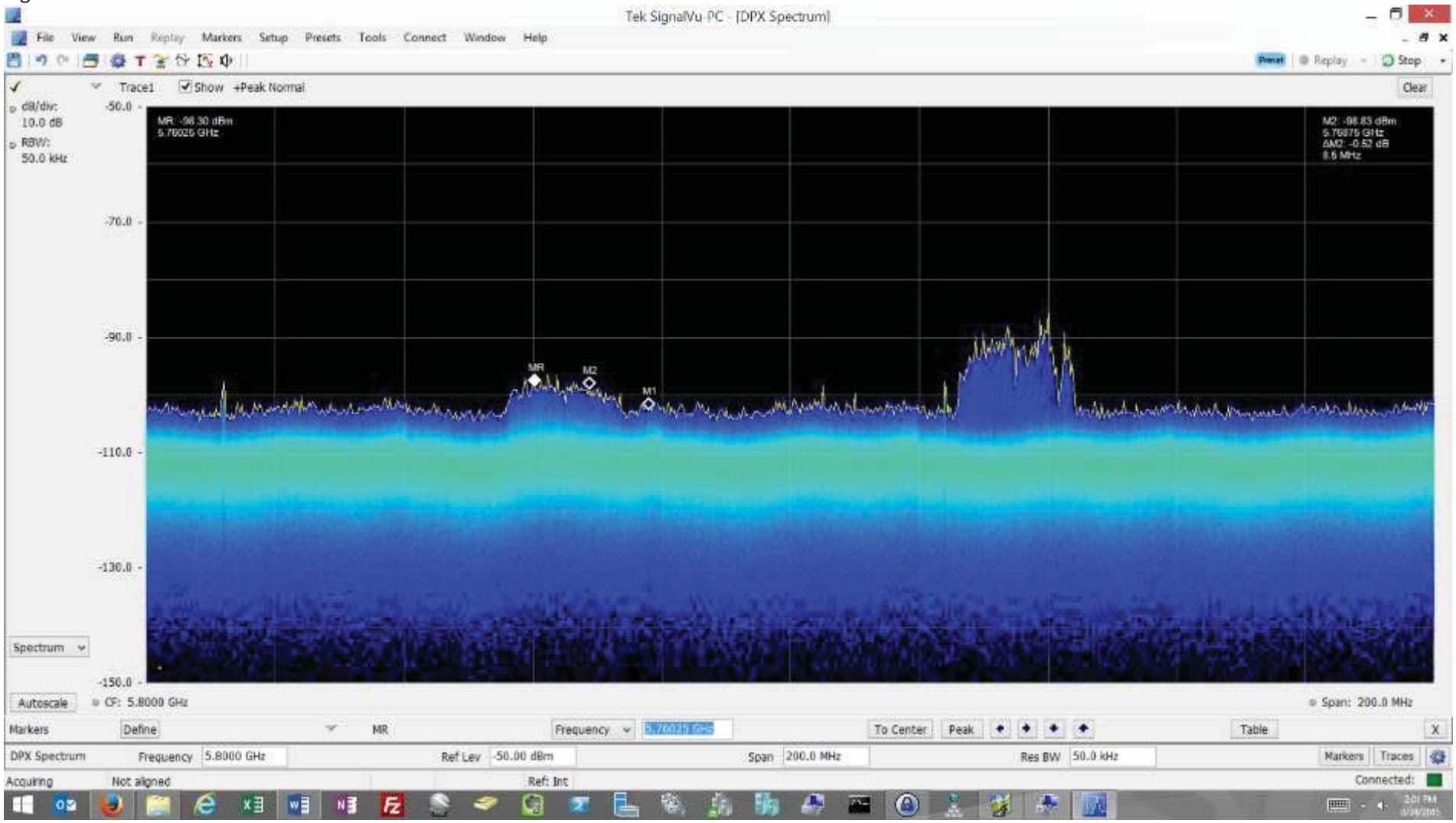
SE sector approx. 120 degrees



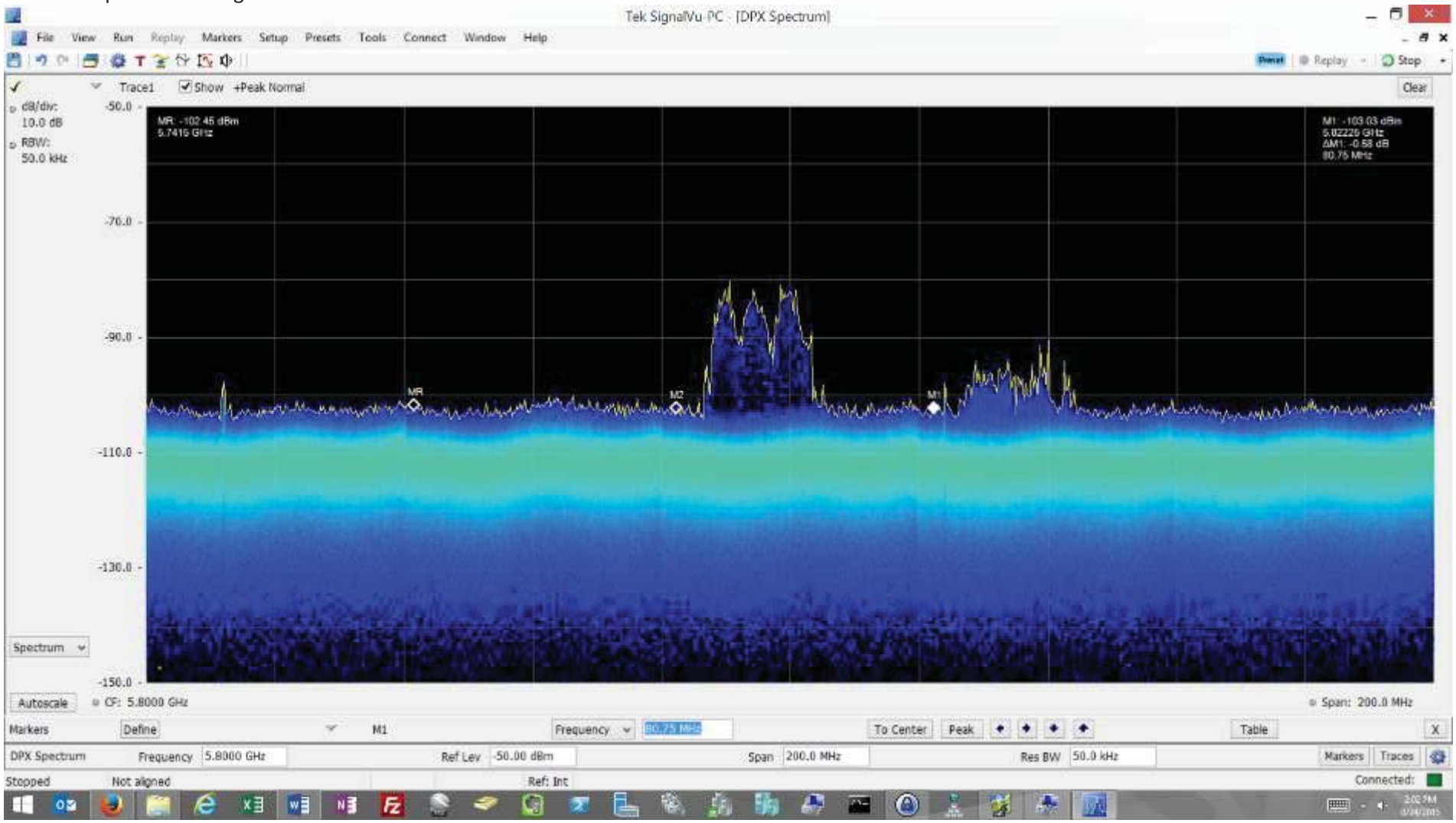
Test Location of east side of Iola Water Tower



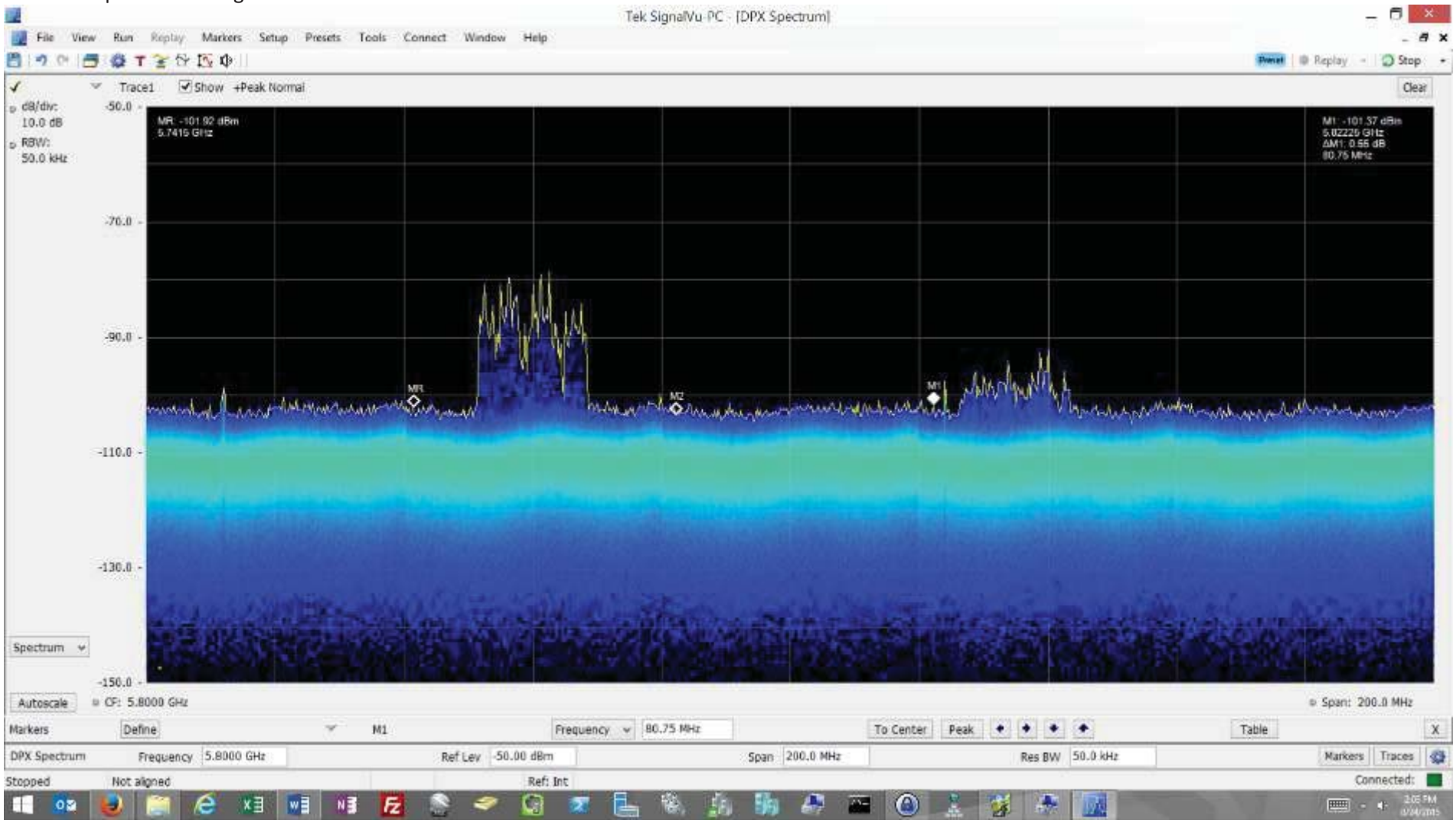
Signal received from Iola water tower



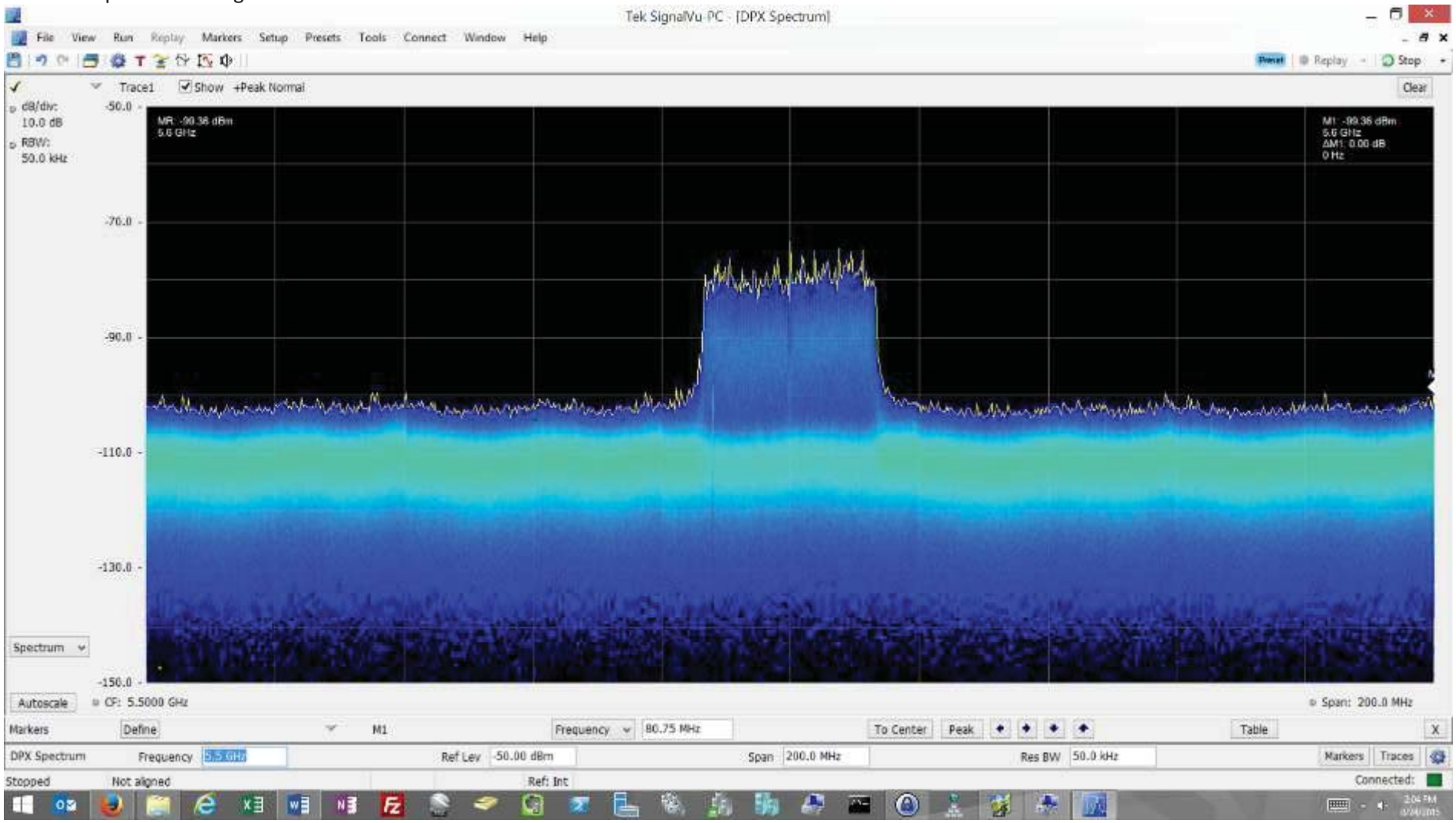
Another capture of the signal from Iola Water Tower



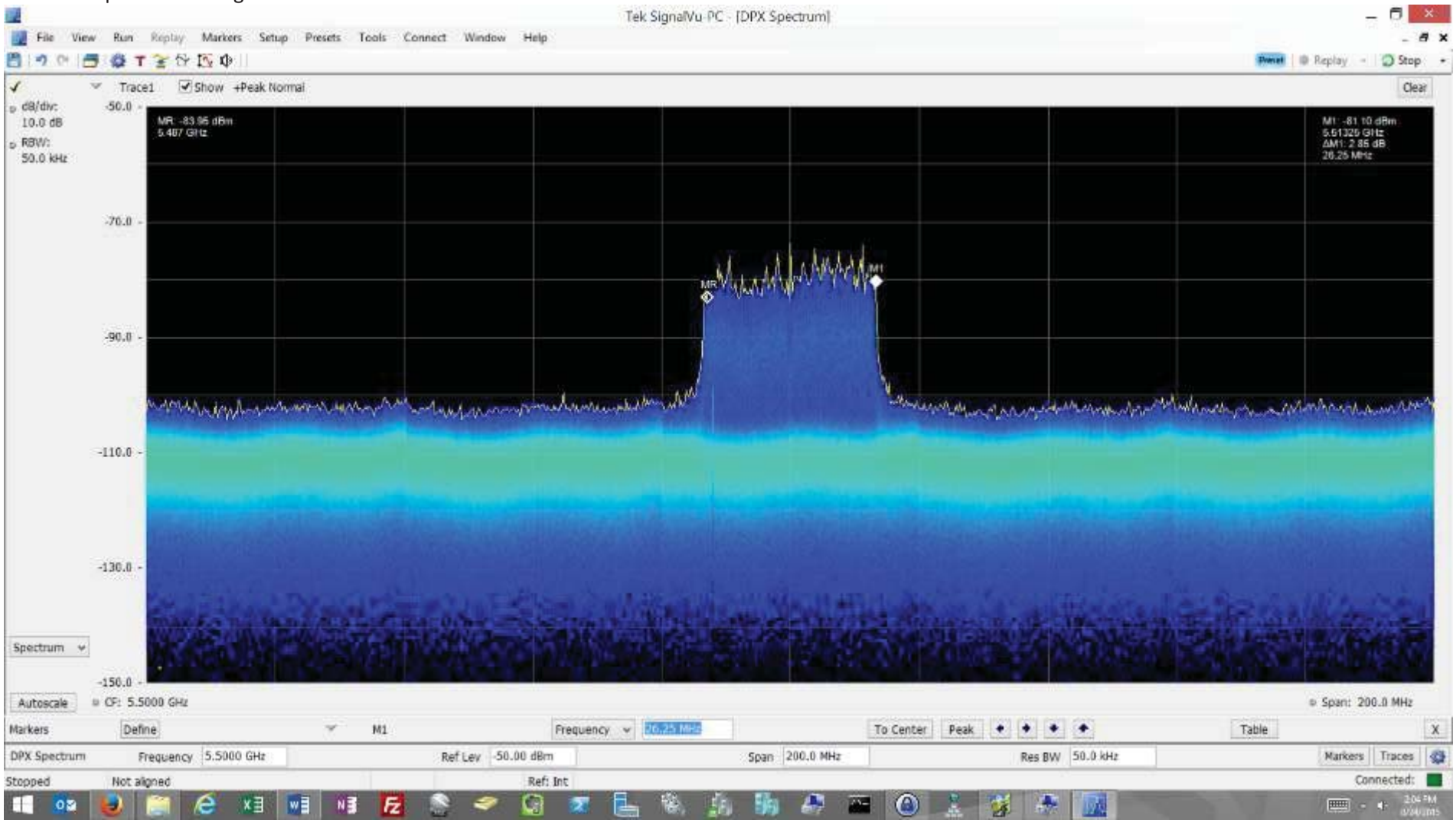
Another capture of the signal from Iola Water Tower



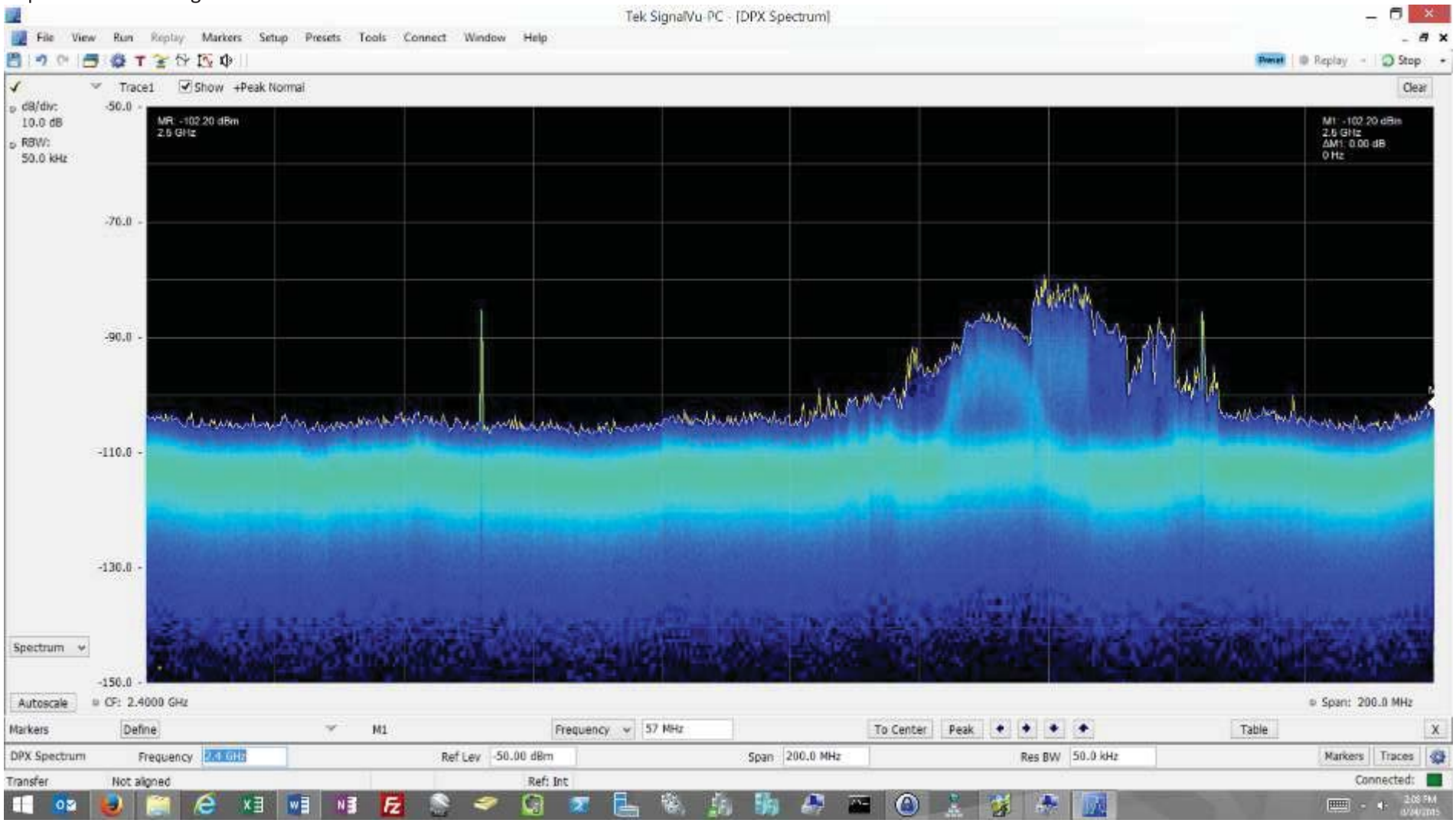
Another capture of the signal from Iola Water Tower



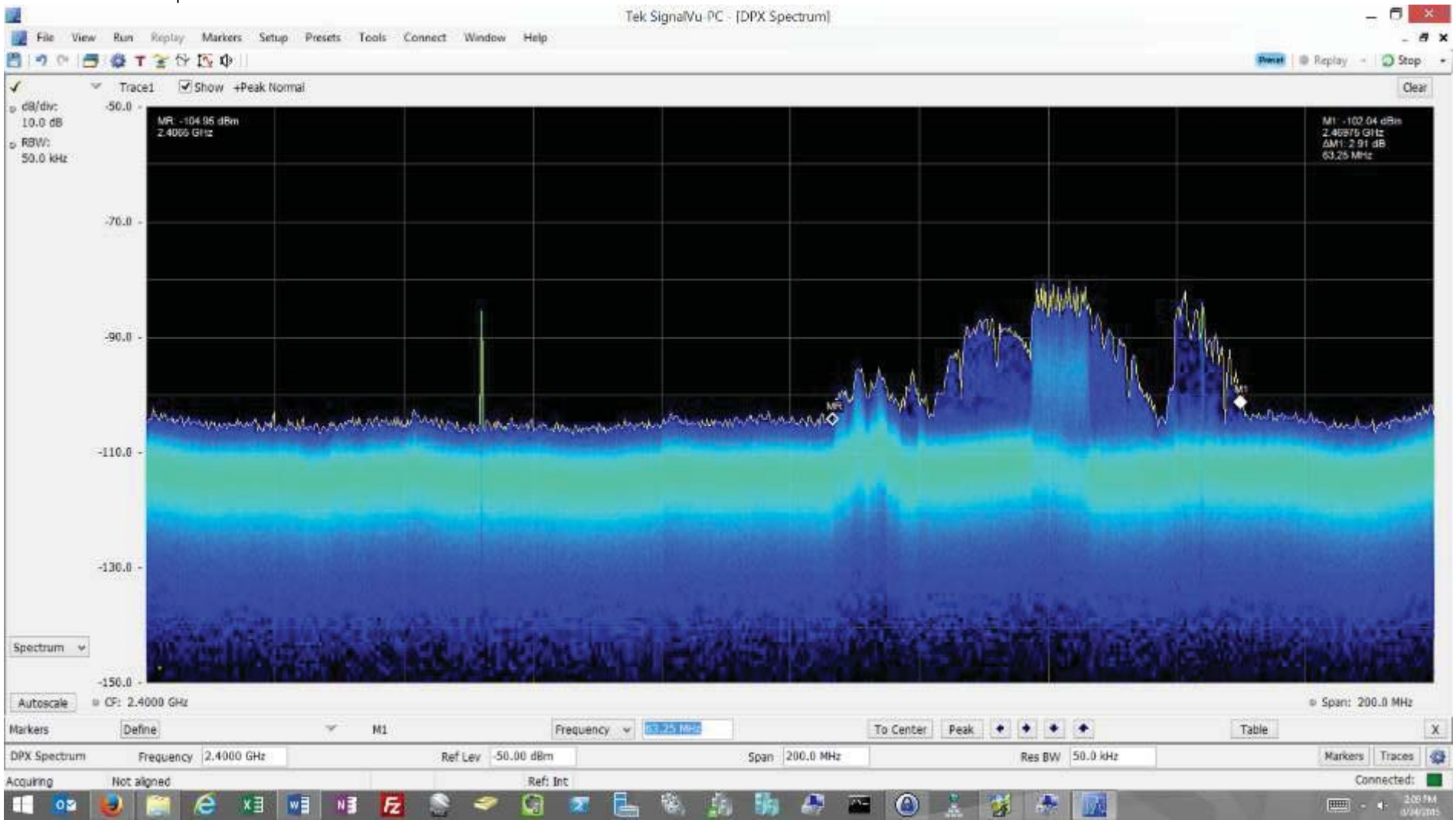
Another capture of the signal of Iola Water Tower



Capture of 2.4GHz signal at test location



Another 2.4GHz capture at test location

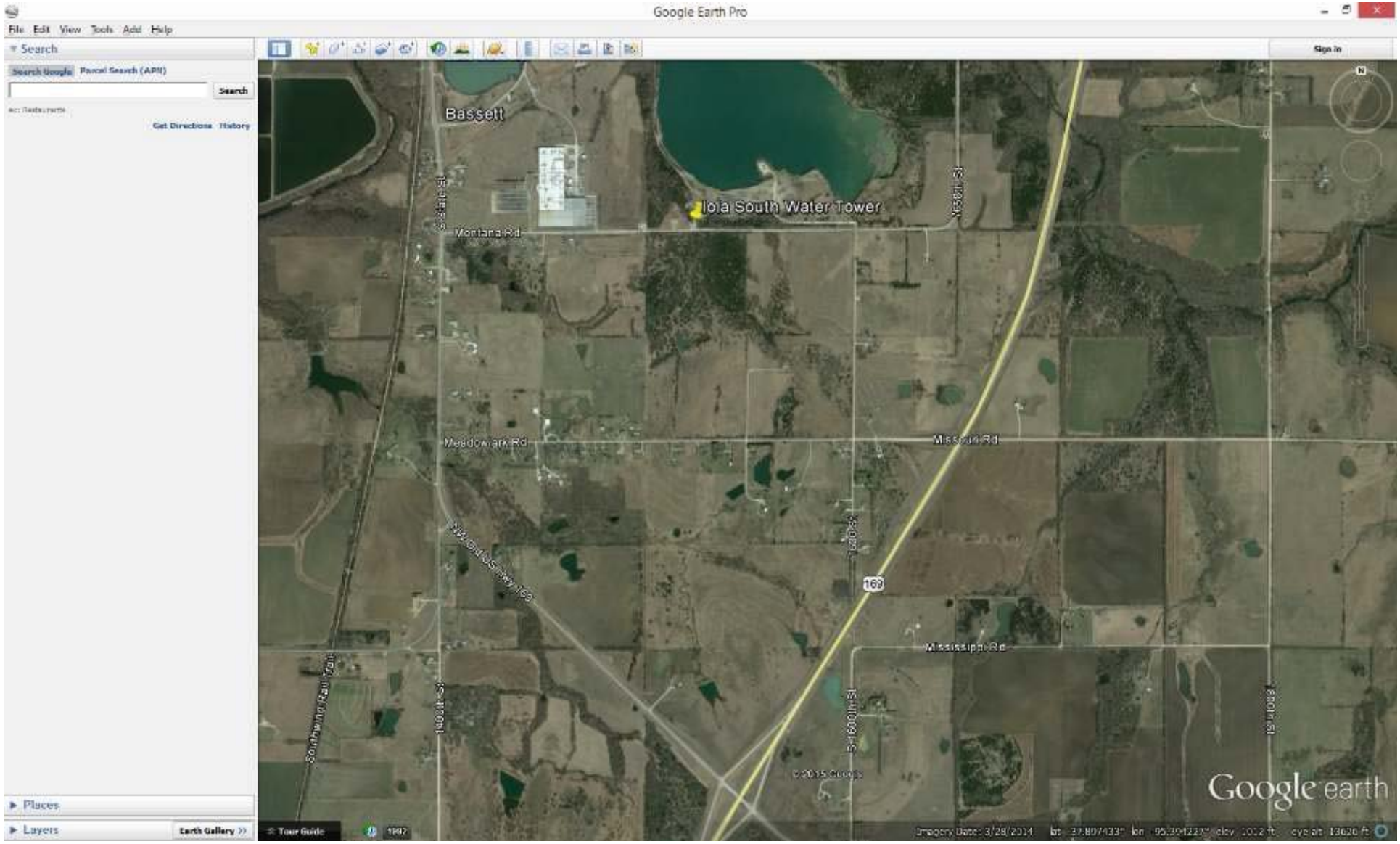


Iola South Water Tower
37.900541 -95.398118
90 centerline

5.8GHz omni antenna mounted on top of water tower.

Site uses solar power connected to what looks likes two car batteries.

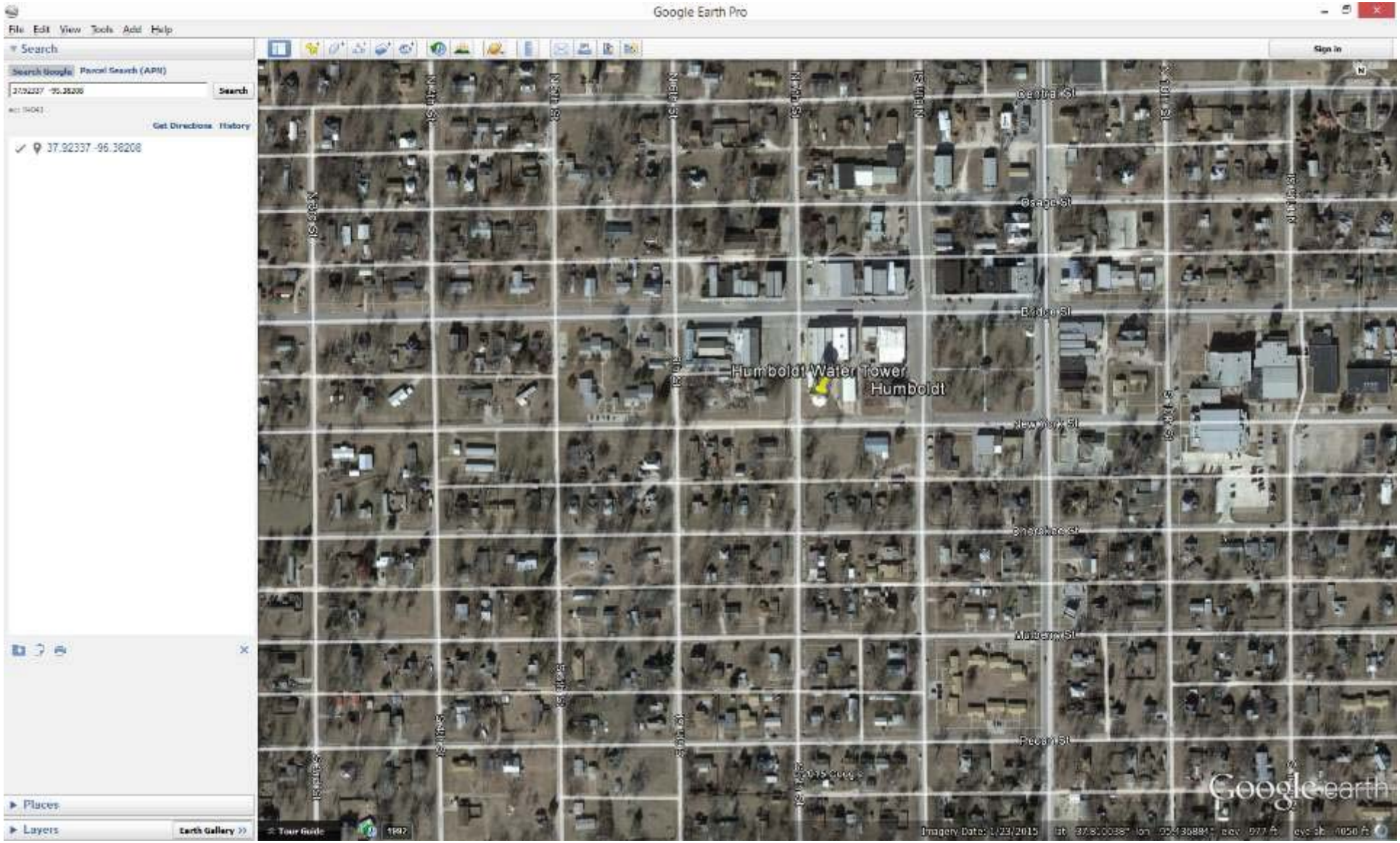
Location of Iola South Water Tower



Humboldt Water Tower
37.810476 -95.437944
120’ centerline

0,120, 240 sectors

Location of the Humboldt Water Tower



Test Location F: census block 200019527001080

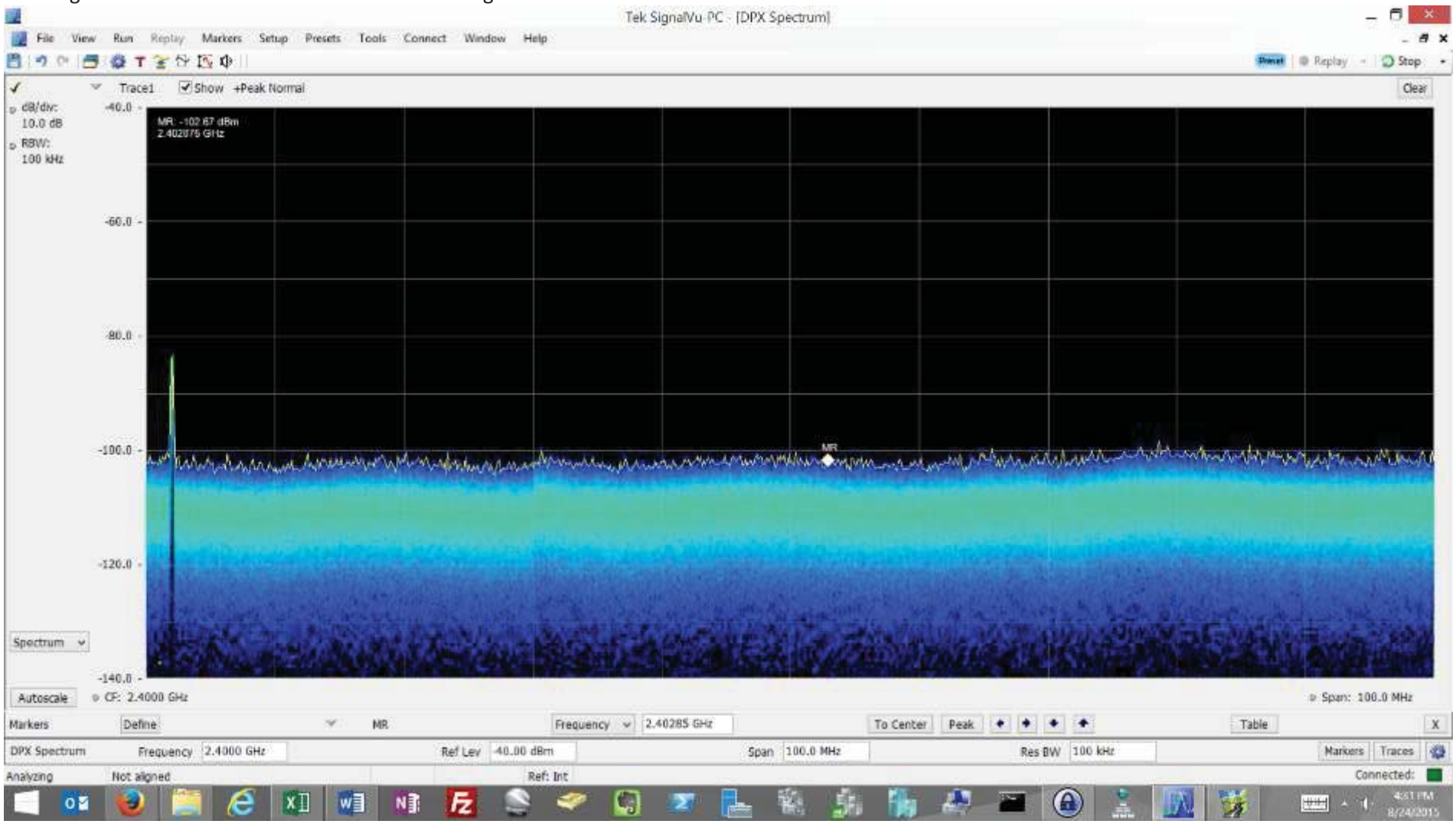
37.00764 -95.29382

We used the NanoBridge M5 to search for 5.8Ghz signals toward North Moran water tower, LaHarpe Water Tower, and North Iola Water Tower.

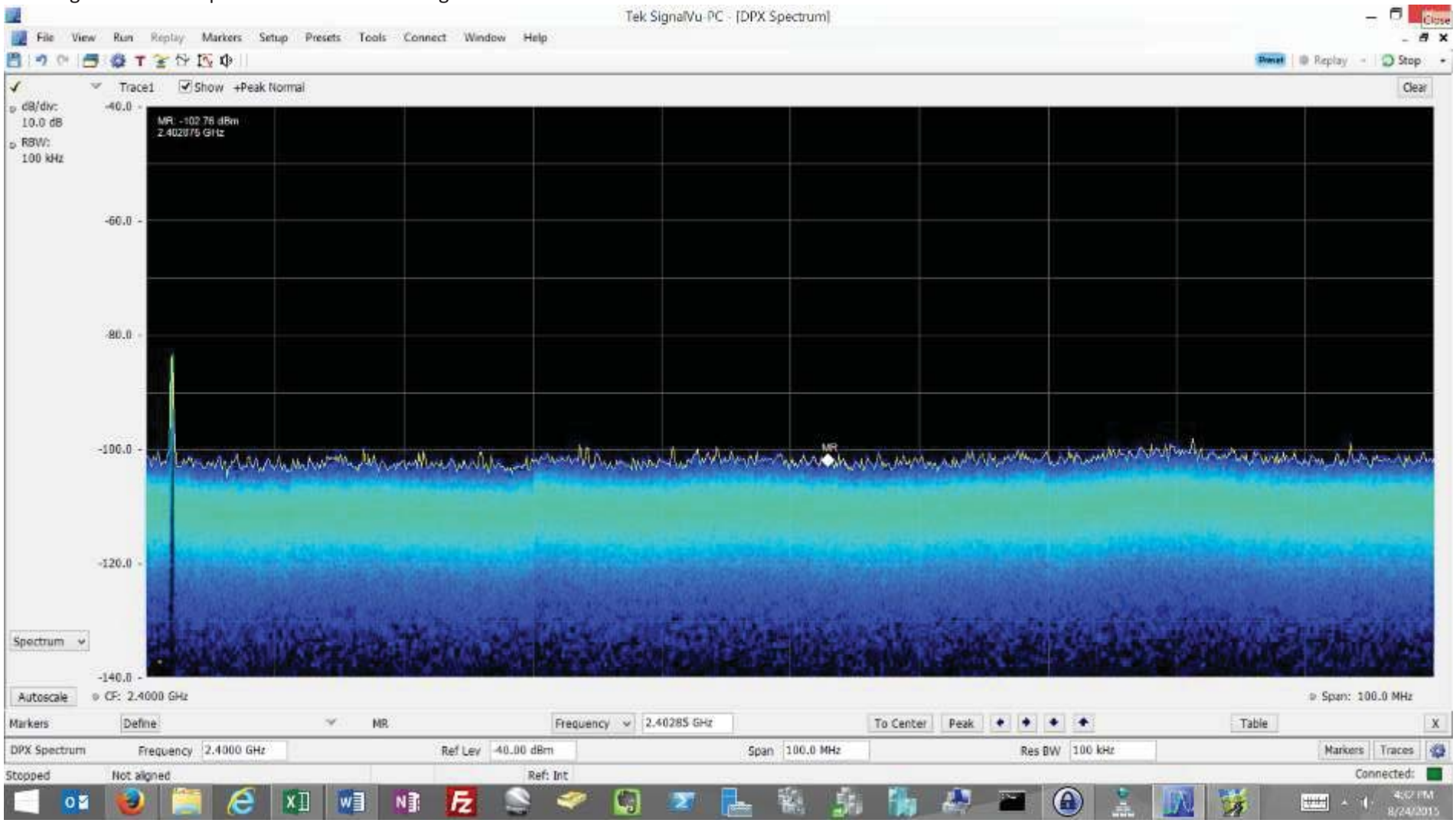
Centerline 10';

Heavy tree line to the north, east, west of home. Terrain to the south blocks the view to the LaHarpe Water Tower

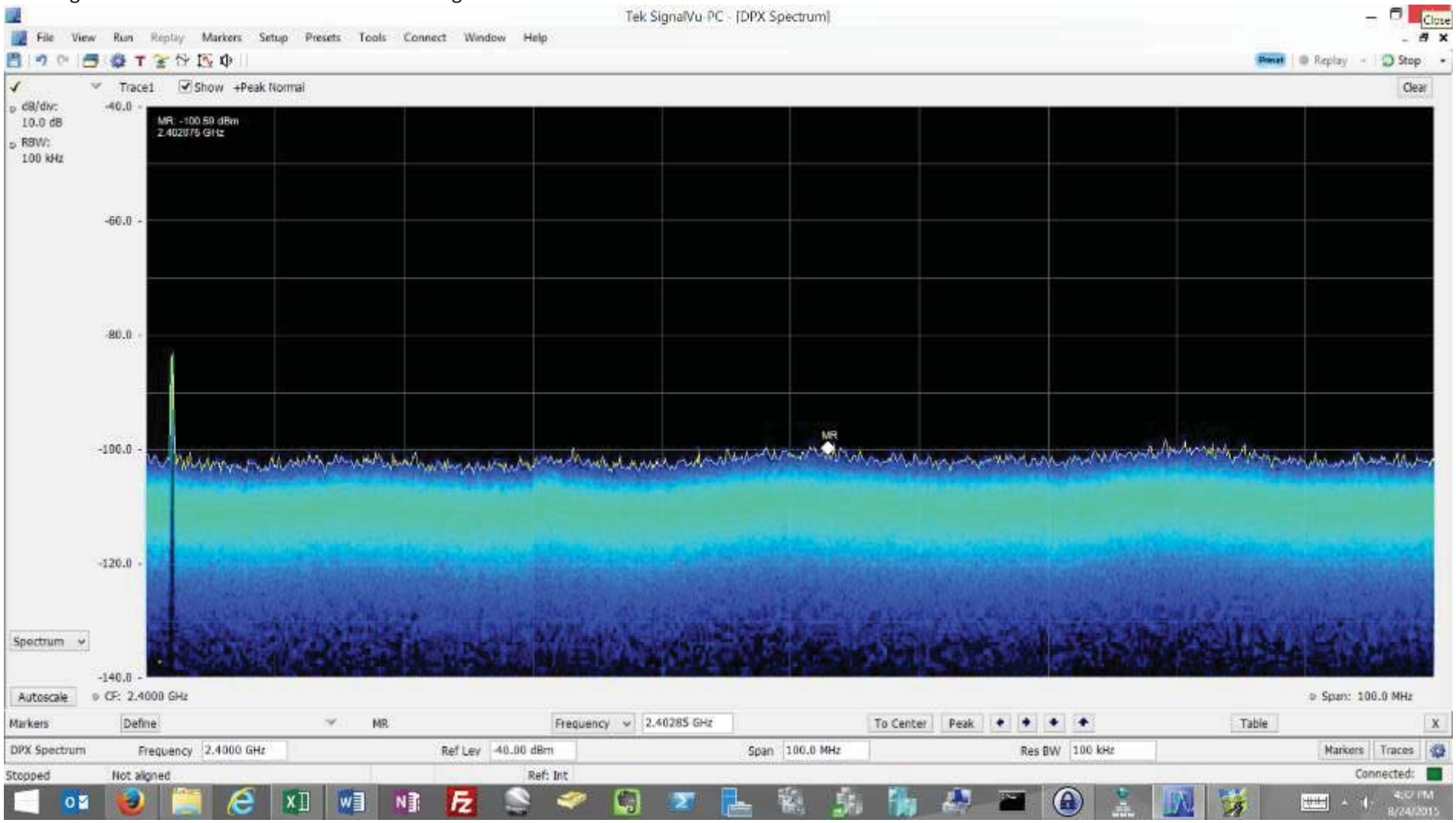
Pointing toward North Moran Water Tower searching for 2.4GHz



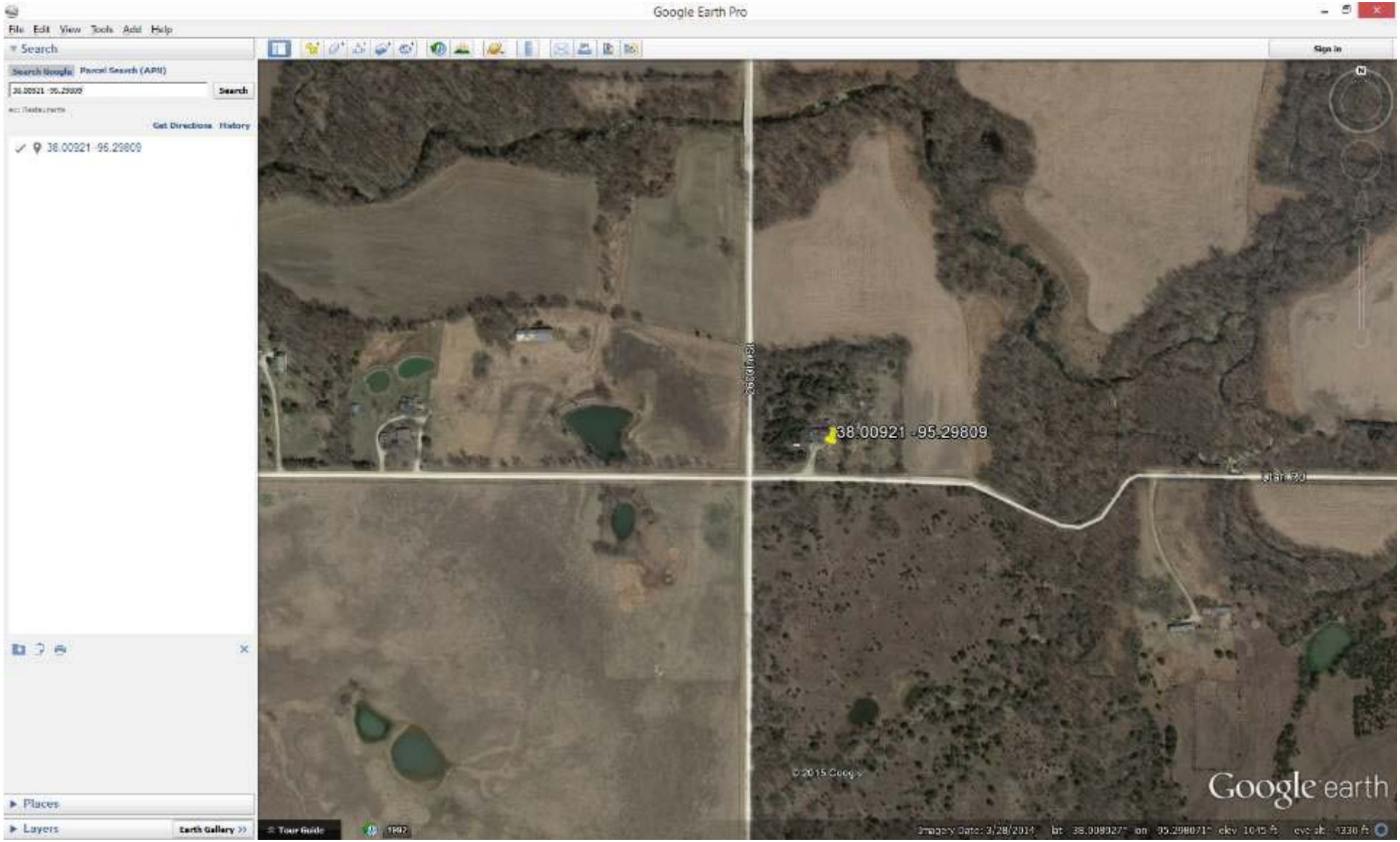
Pointing toward LaHarpe Water Tower searching for 2.4GHz



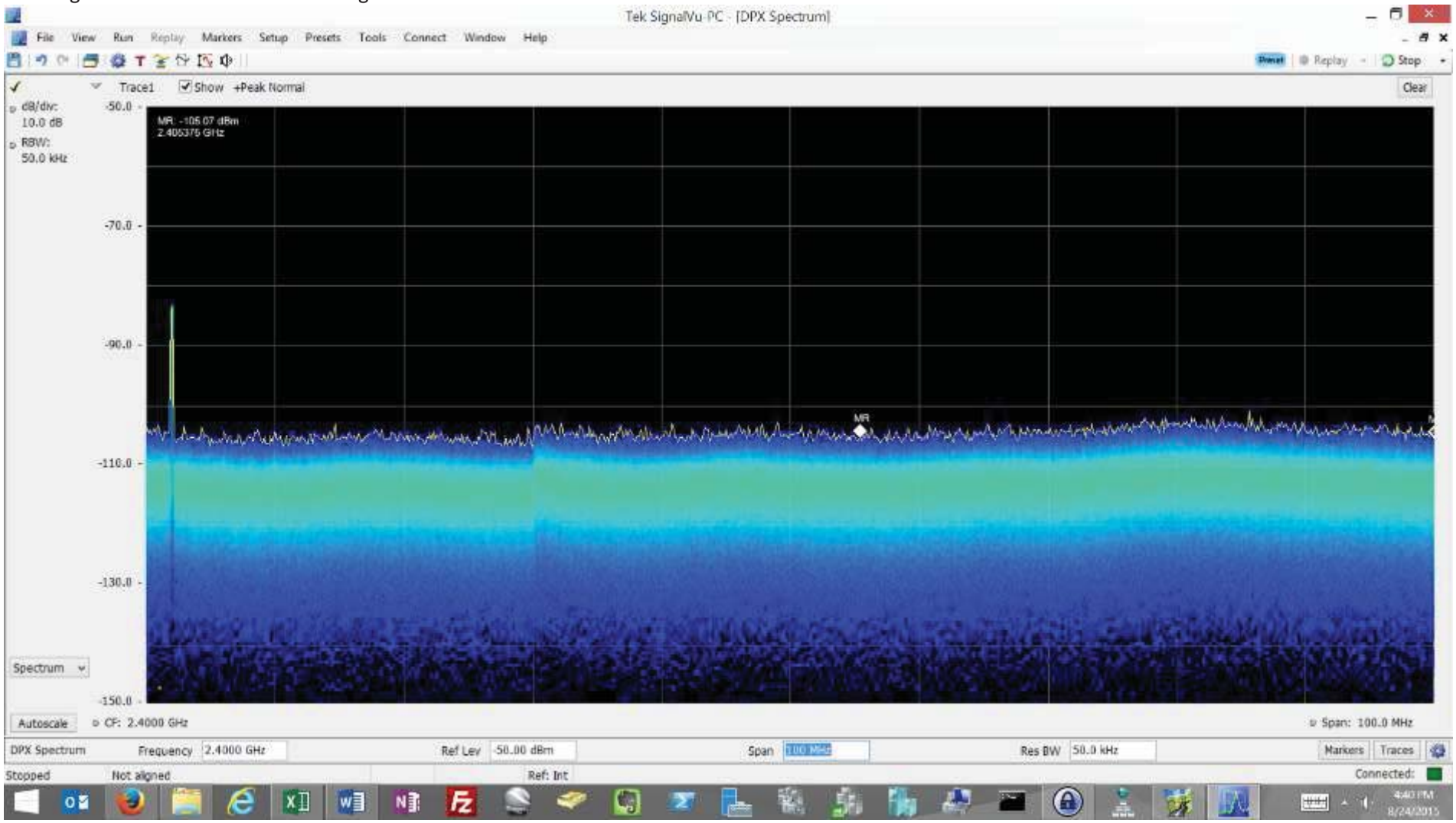
Pointing toward North Iola Water tower searching for 2.4GHz



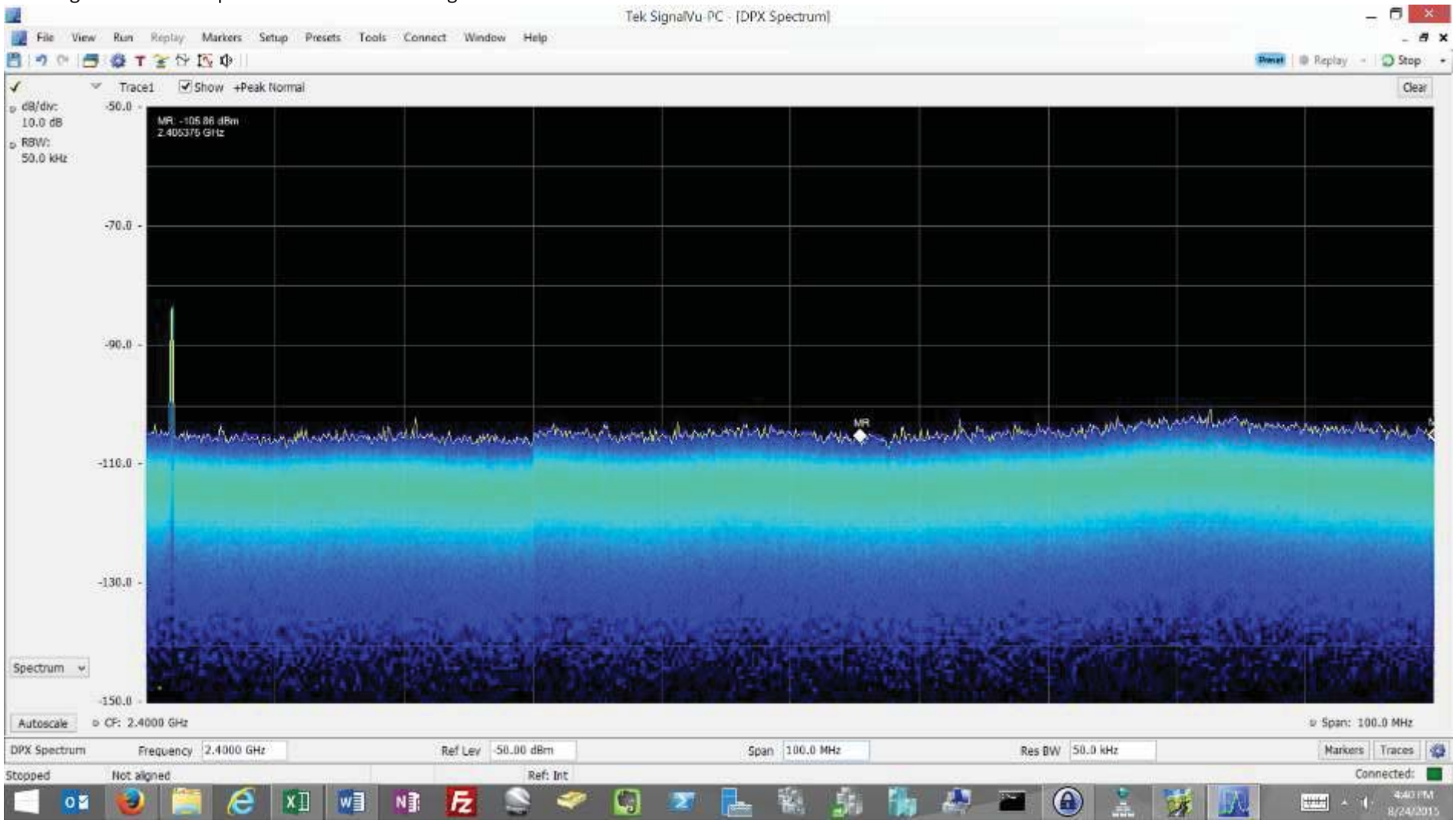
Test Location I: census block 200019527001079
38.00921 -95.29809
Centerline 8’
Heavy tree line to the north, east, west of home. Terrain to the south blocks the view to the LaHarpe Water Tower



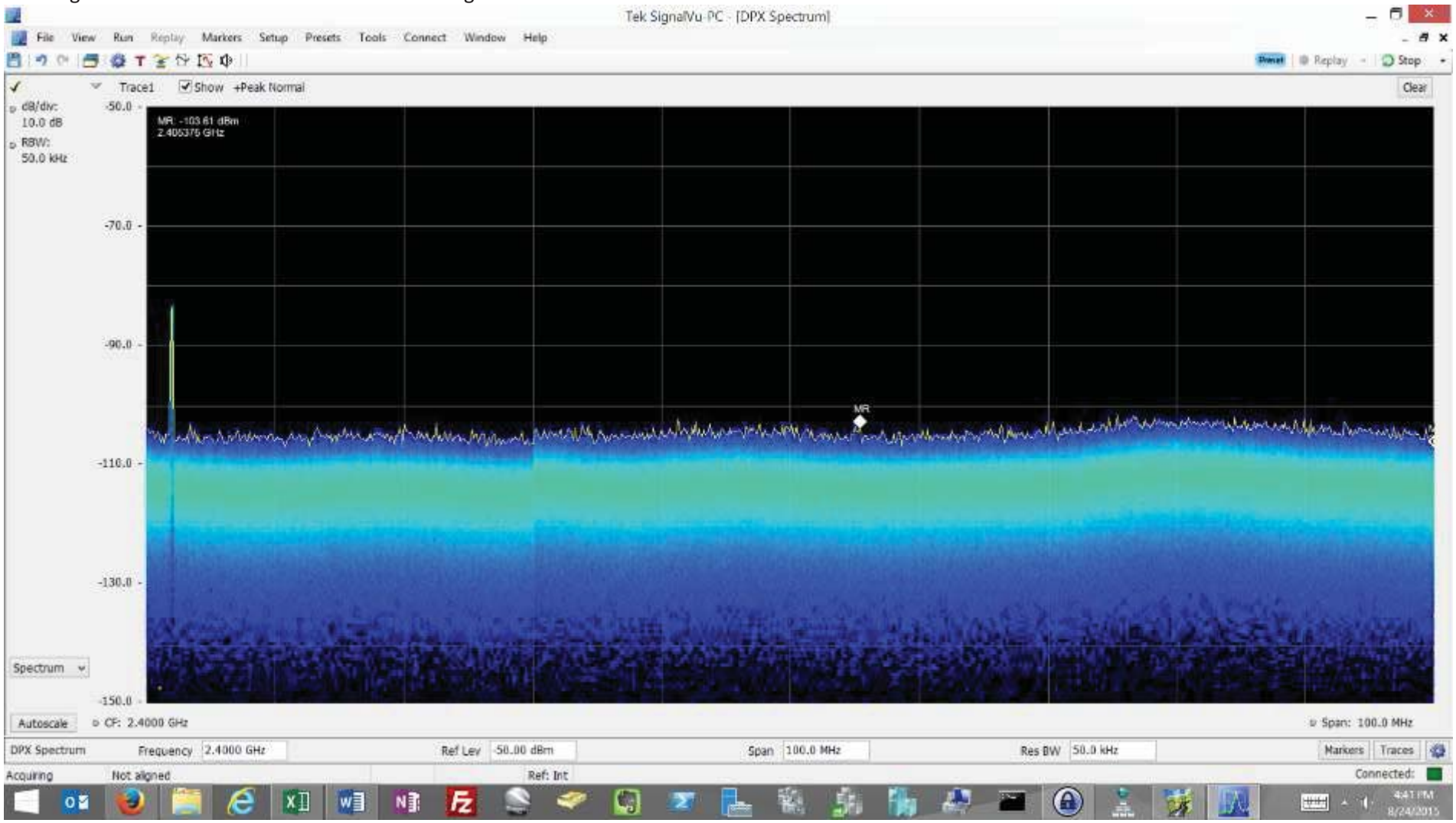
Pointing toward North Moran searching for 2.4GHz



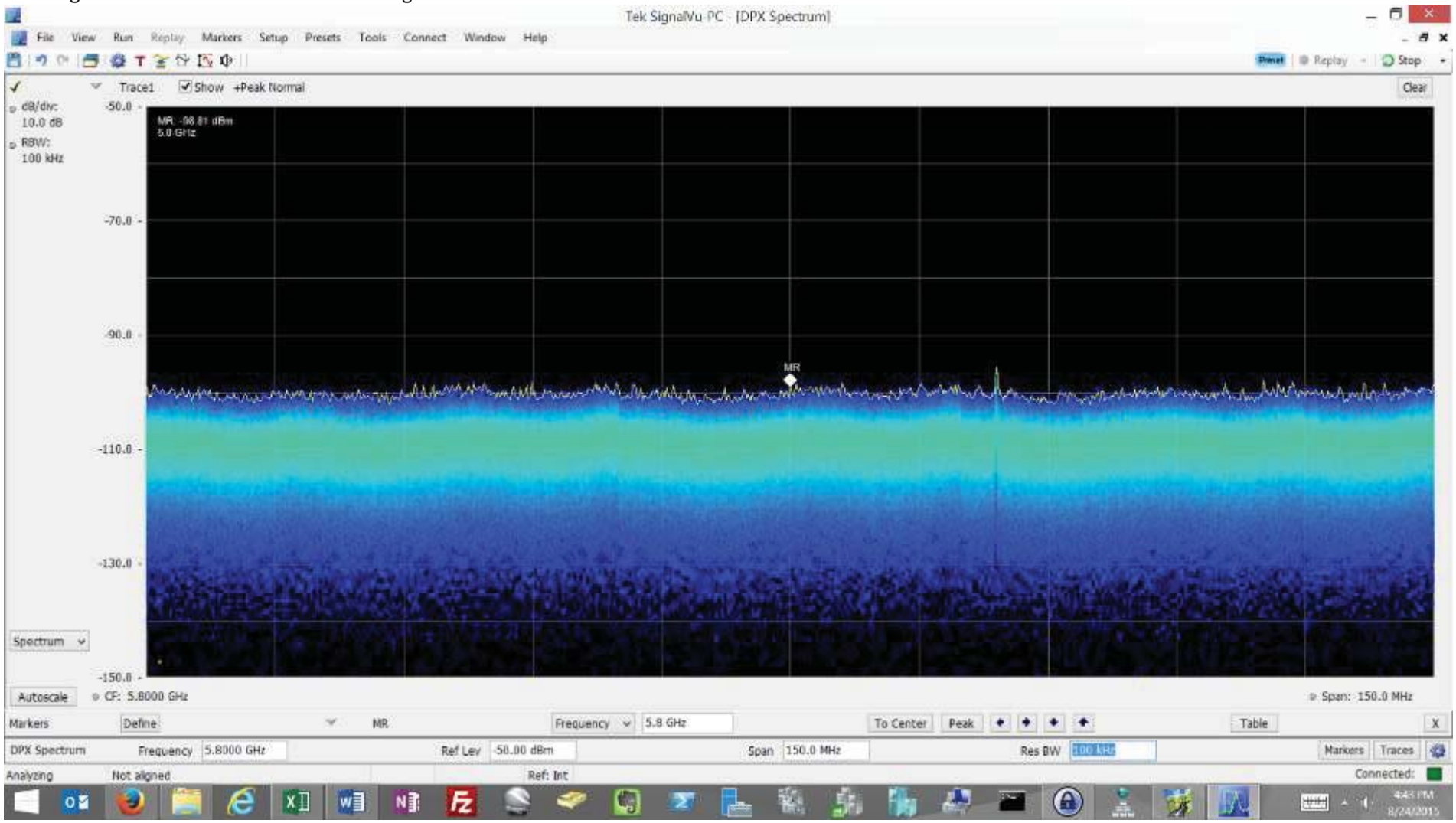
Pointing towards LaHarpe Water Tower searching for 2.4GHz



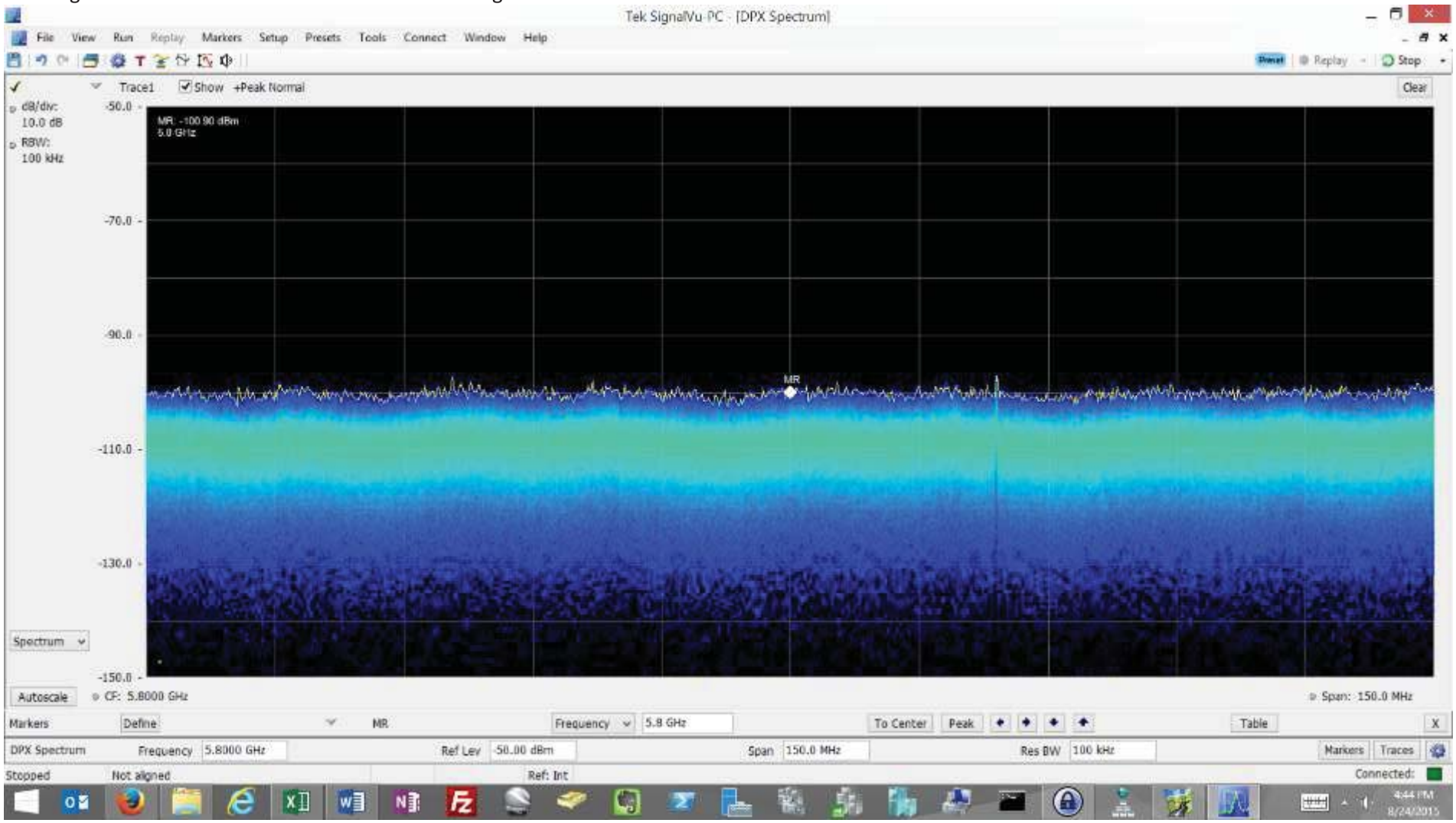
Pointing towards North Iola Water Tower searching for 2.4GHz



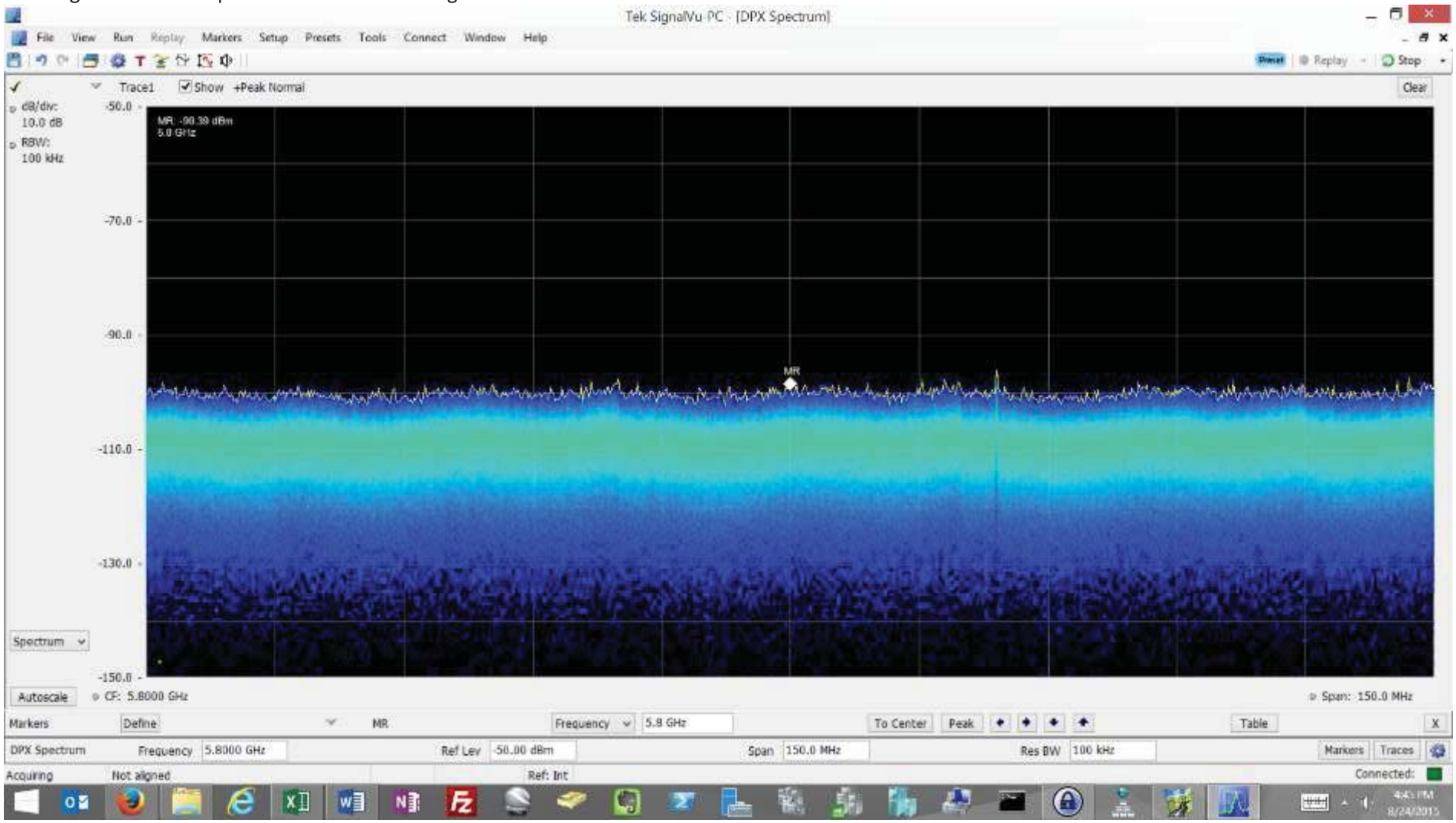
Pointing towards North Iola Tower searching for 5.8GHz



Pointing towards North Moran Water Tower searching for 5.8GHz

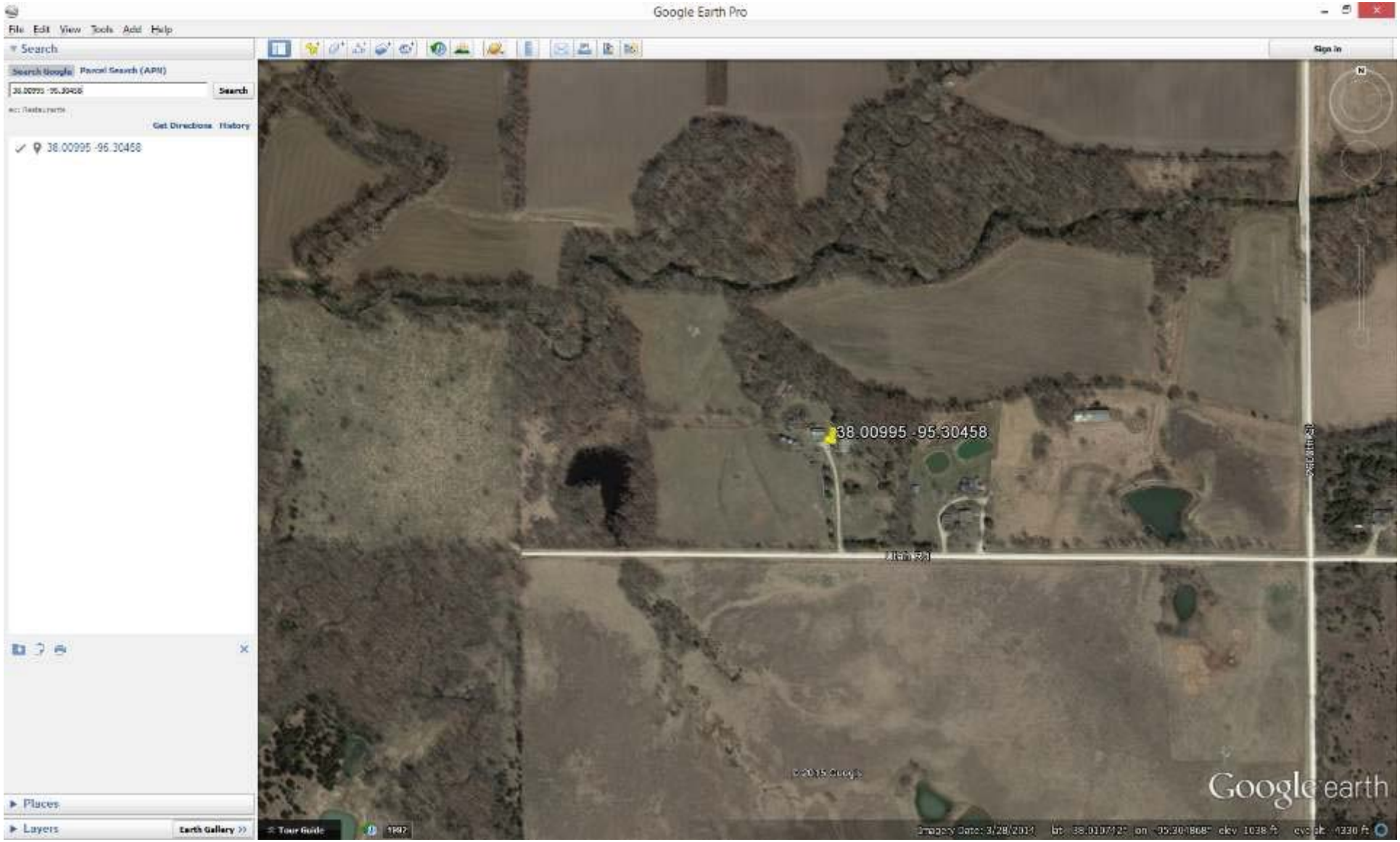


Pointing towards LaHarpe Water Tower searching for 5.8GHz

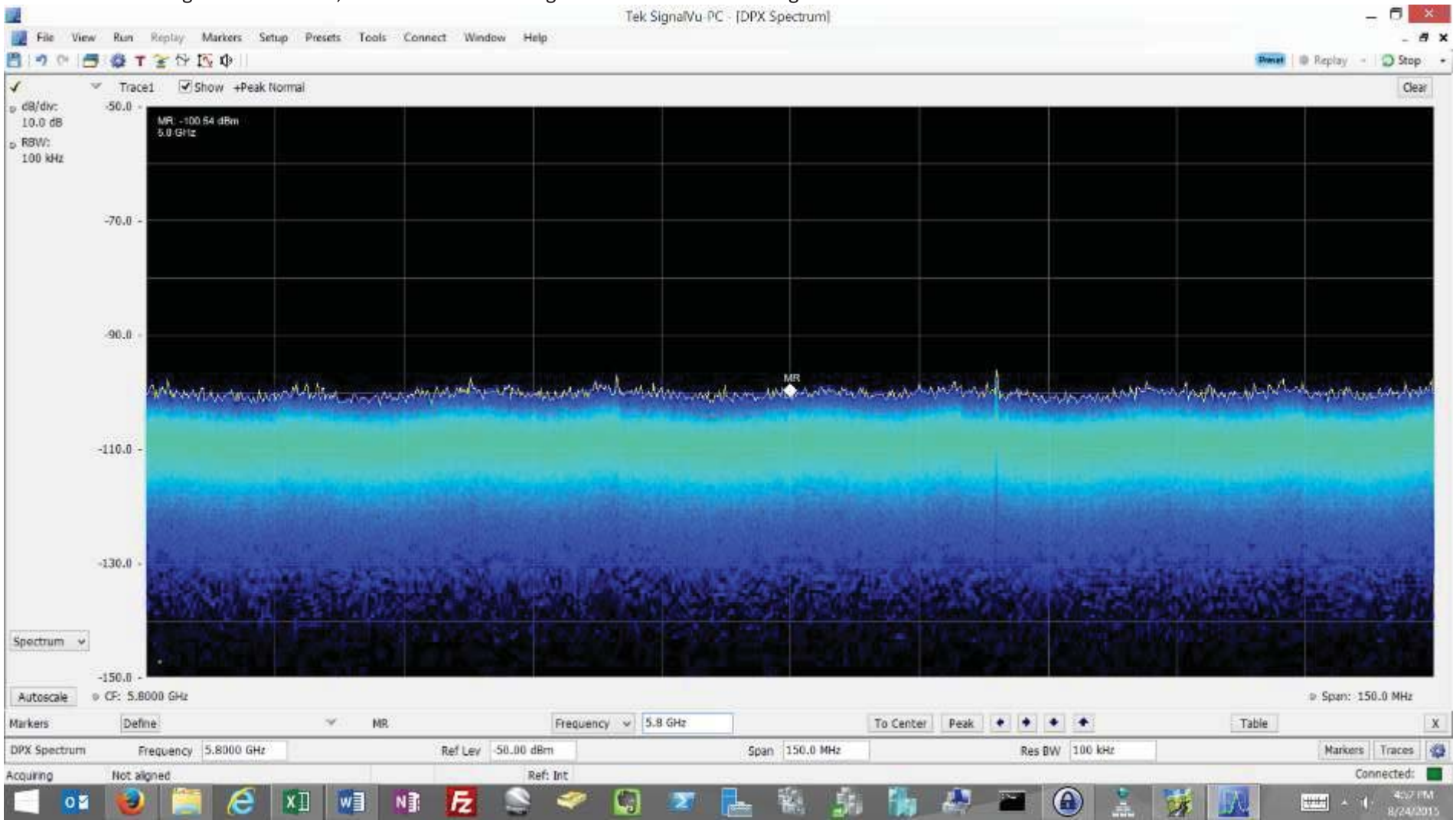


Test Location B: census block 200019527001078
38.00995 -95.30458

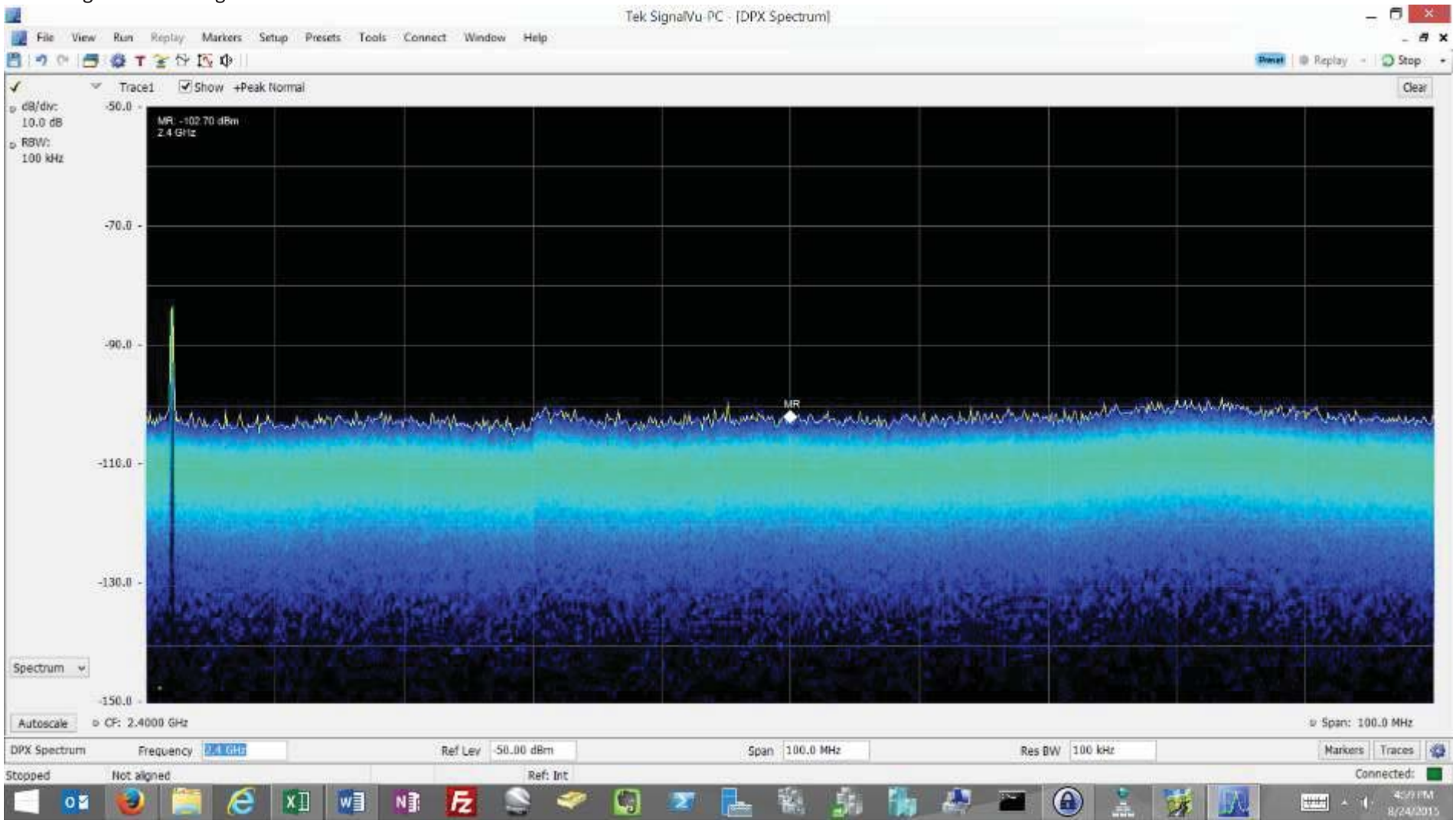
Many tall trees on all sides of home.



Panned 120-240 degrees from north, centerline at 5’ looking under trees for 5.8GHz signal

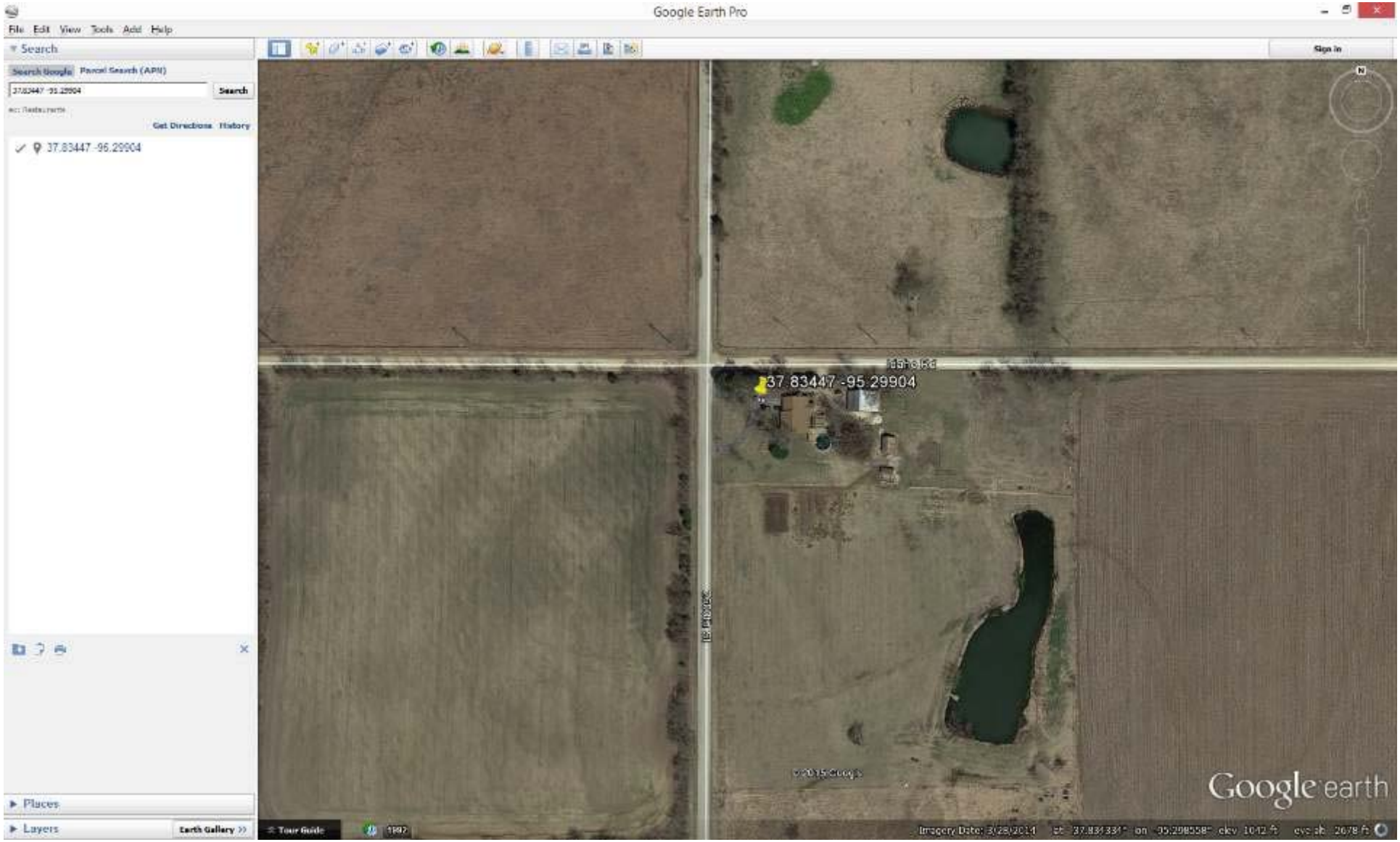


Searching for 2.4GHz signal from same direction as above



Test Location G: census block 200019526001458
37.83447 -95.29904

Centerline approx. 6’ trying to look under trees toward LaHarpe. Tall trees on north side of home
Trees also blocking view to Elsmore water tower. Tested for 2.4GHz and 5.8GHz - did not find any signal



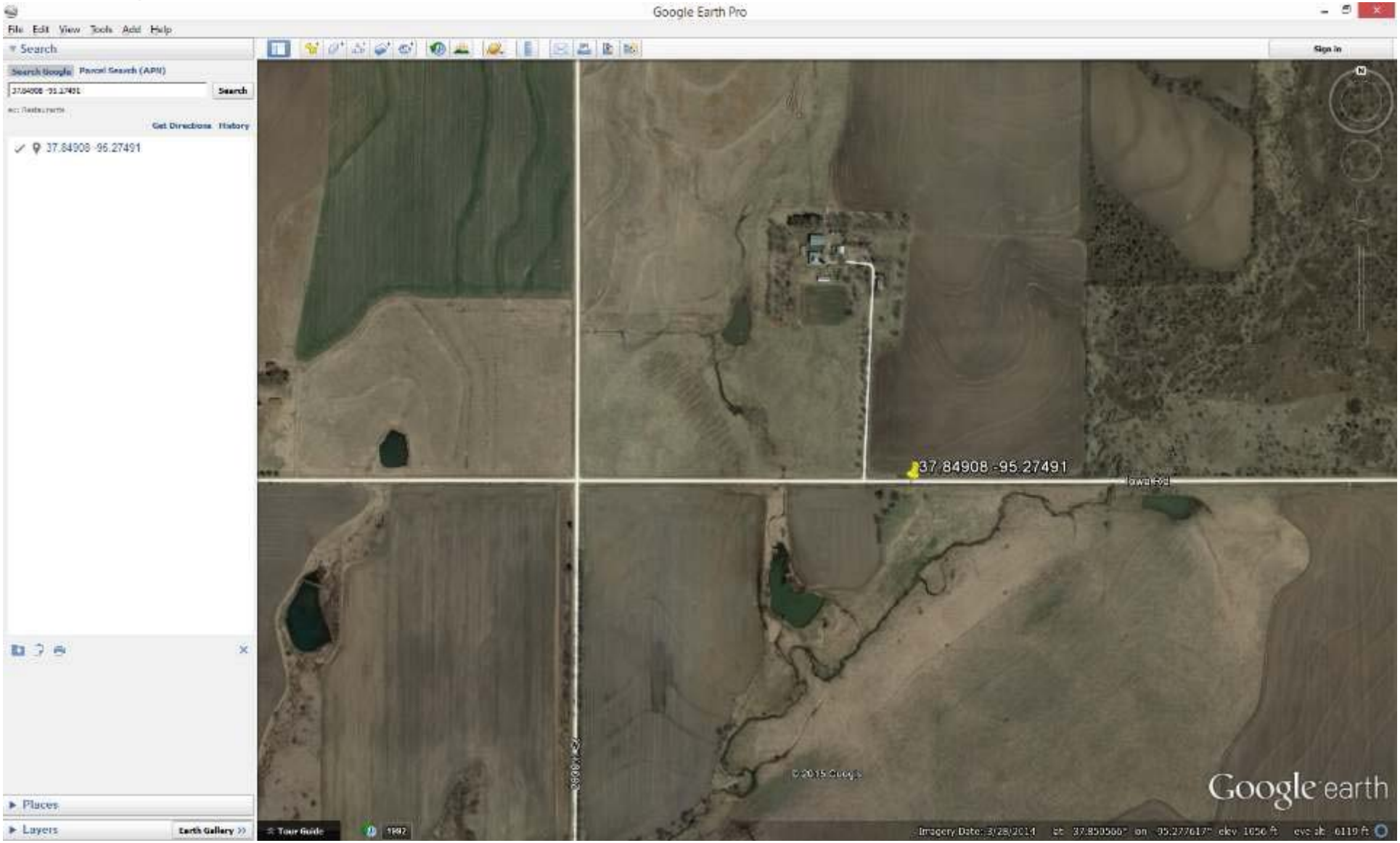
Test Location K: census block 200019526001413

37.84908 -95.27491

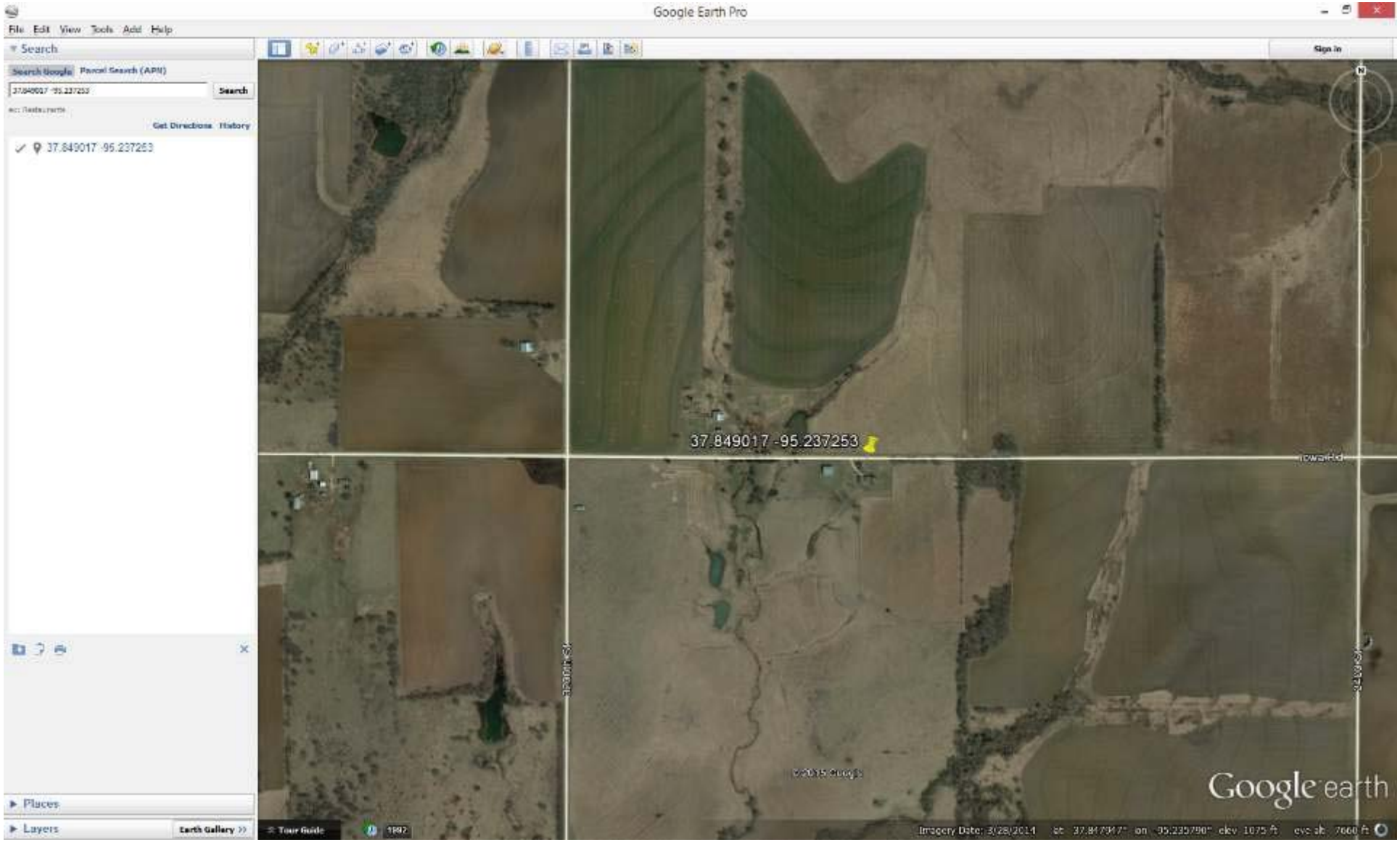
Tested from road adjacent to home; tree line on both sides of driveway and surrounding home; testing location determined to be a better location than near home to obtain optimal signal

centerline 17’-20’; see pictures of testing location looking back toward Elsmore Water tower

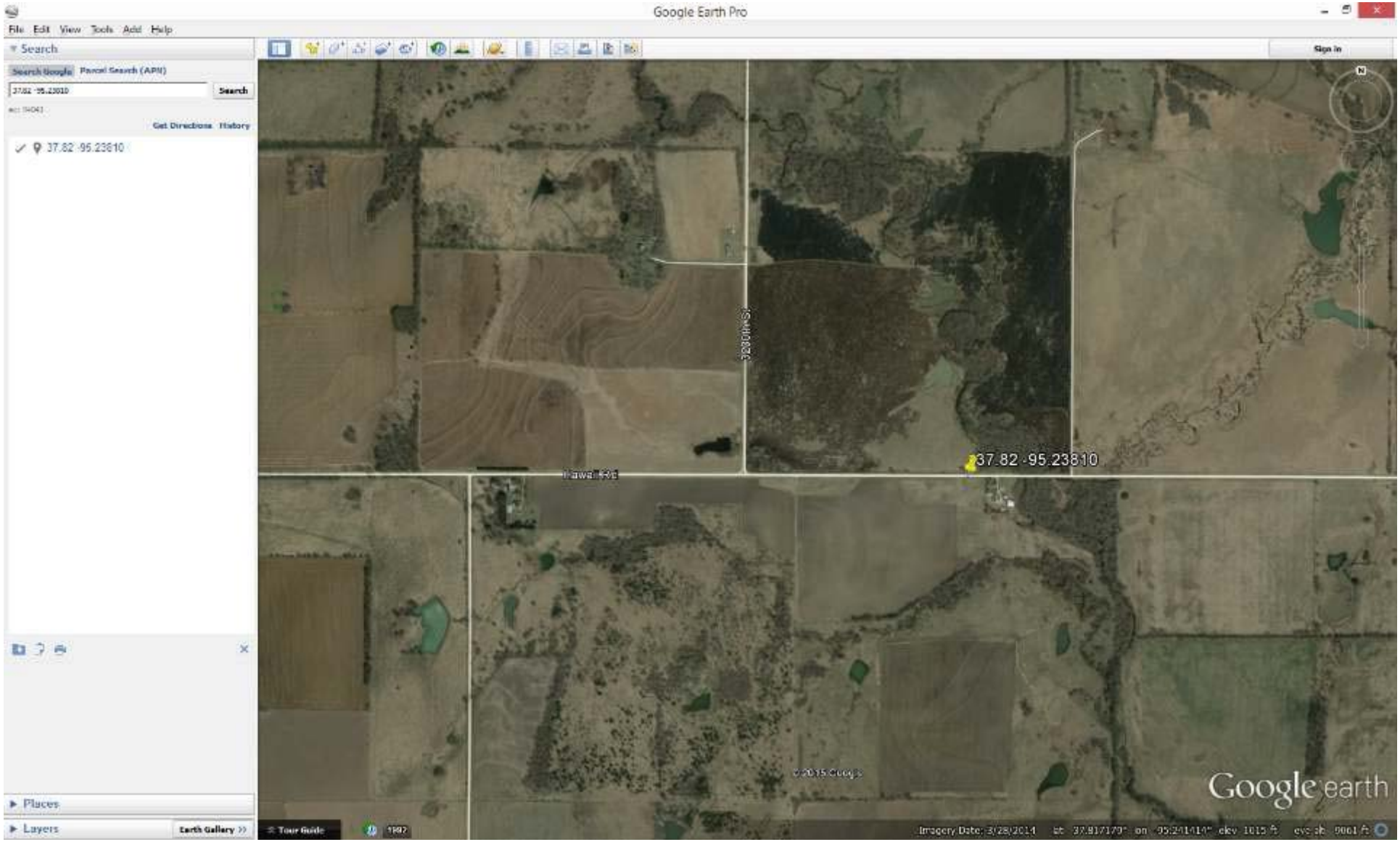
Did not see a signal



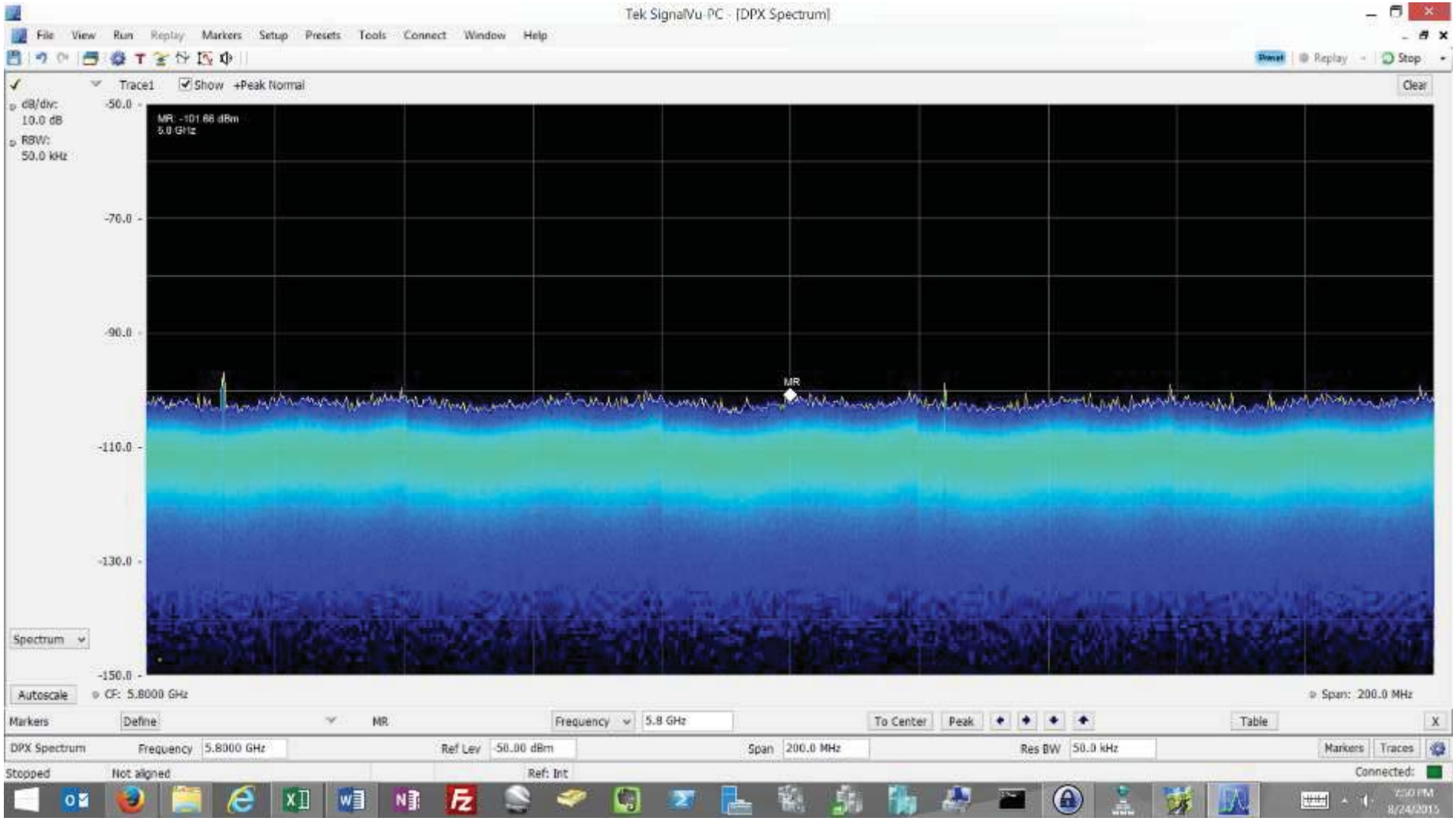
Test Location H: census block 200019526001424
37.849017 -95.237253
Did not find any signal in 2.4GHz or 5.8GHz
Centerline 6’



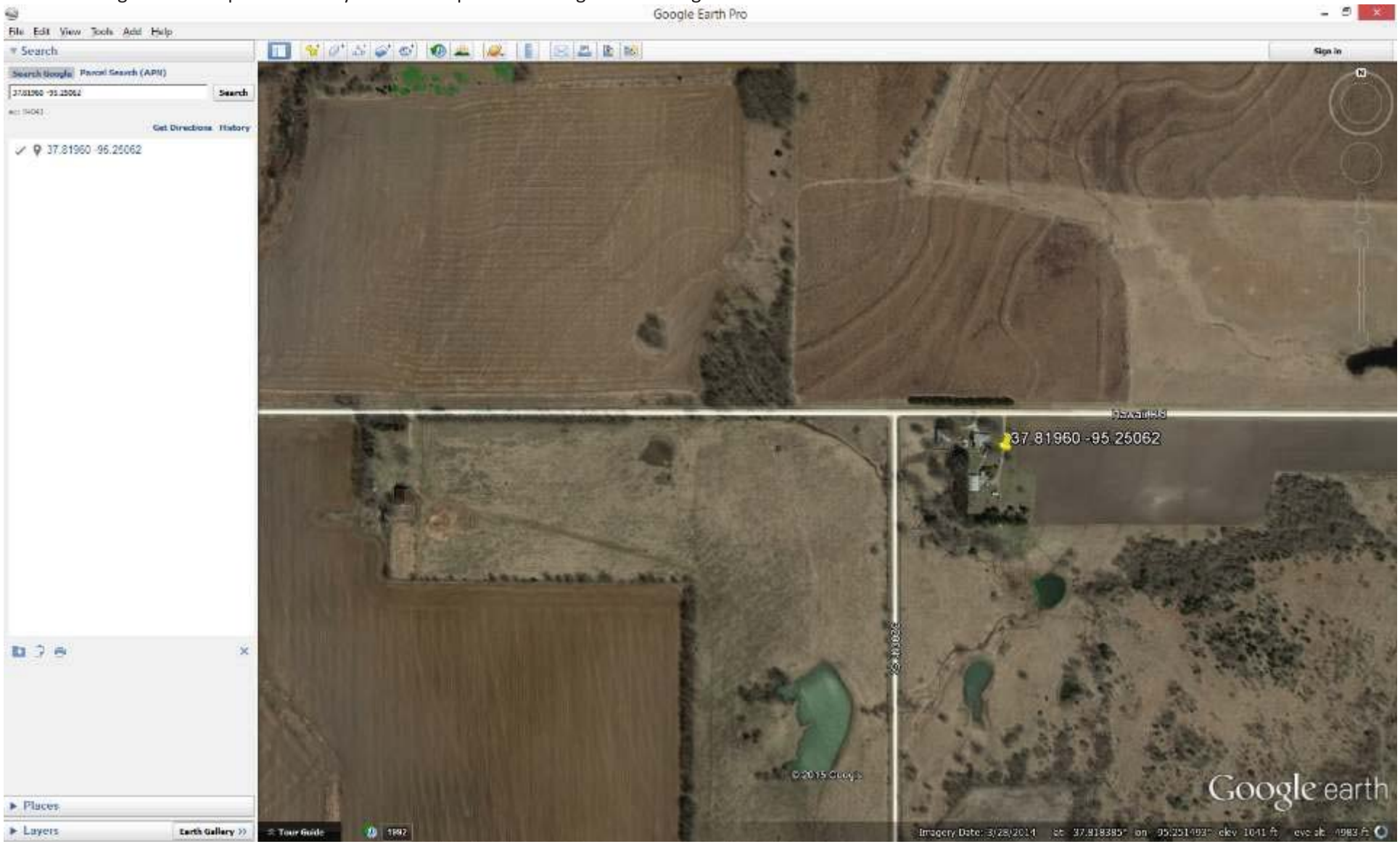
Test Location M: census block 200019526001470
37.82000 -95.23810
Centerline 12’
No signal detected at test location. Test location determined to be a better location than actual location of home. Wall of trees to get through before getting to Elmore Water Tower



Screenshot of 5.8GHz test



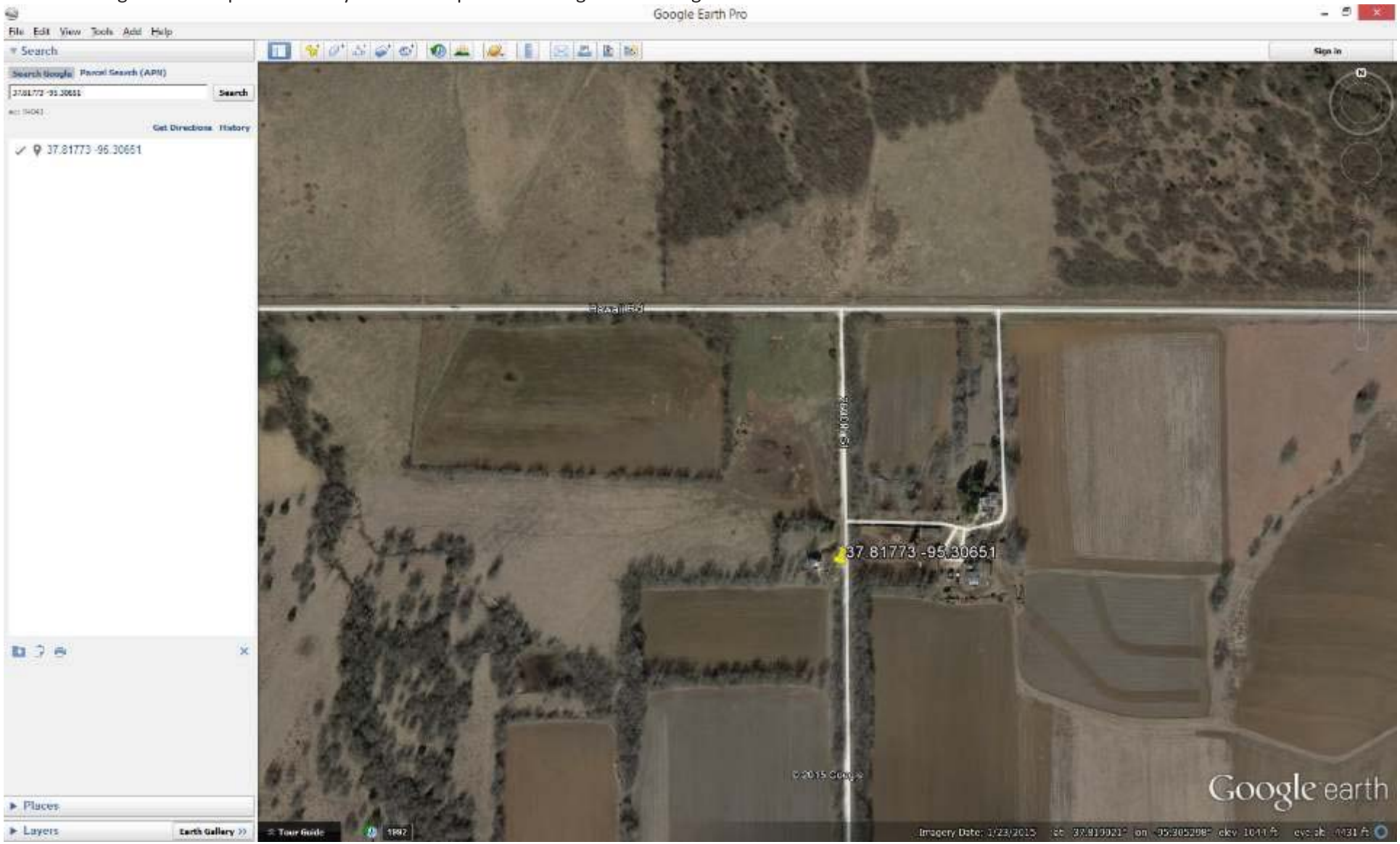
Test Location N: census block 200019526001470
37.81960 -95.25062
Scanning 5.8 at 20’ AGL
Scanned using Tektronix spectrum analyzer and Ubiquiti NanoBridge M5 – no signal found



Test Location O: census block 200019526001588

37.81773 -95.30651

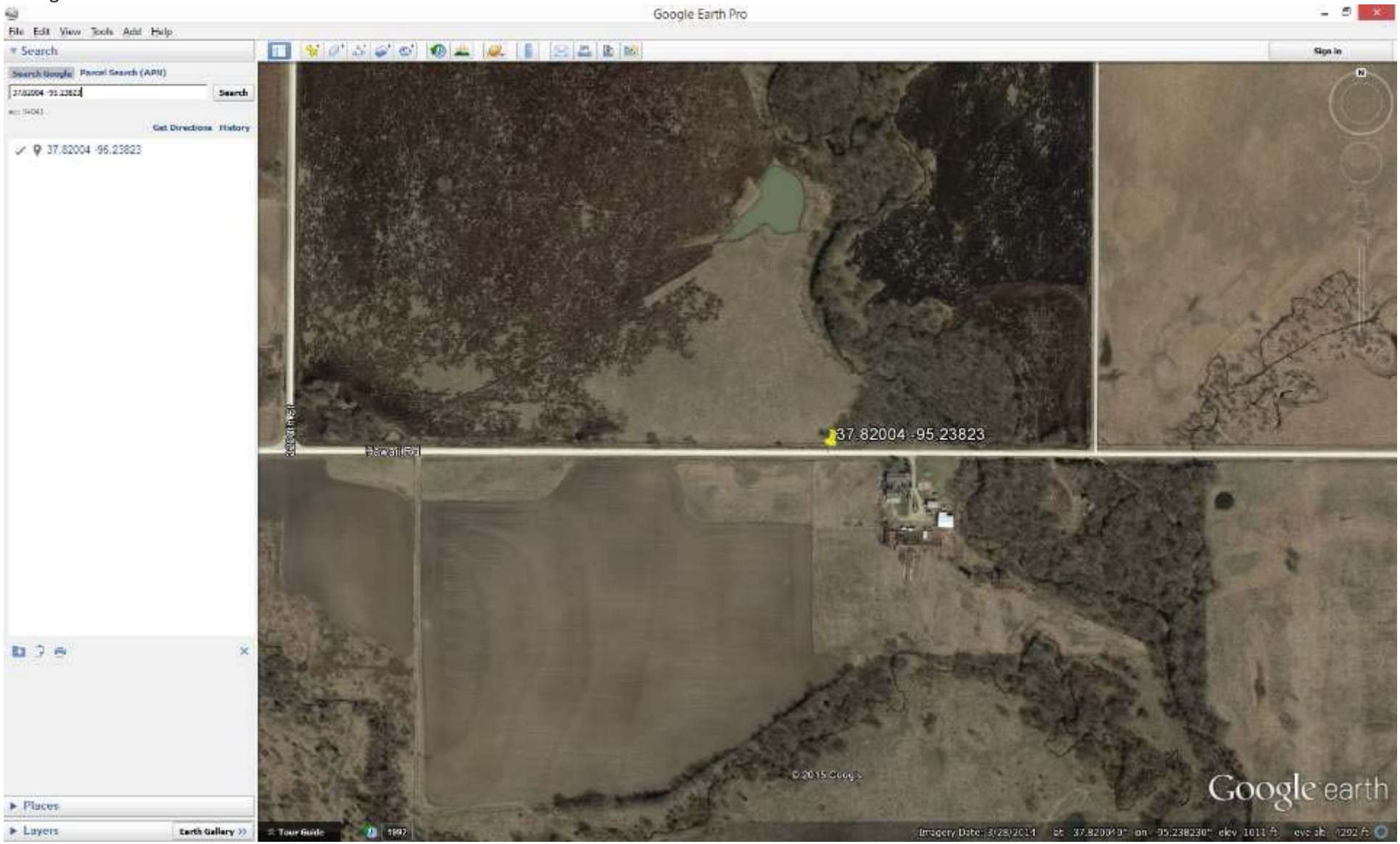
Scanned using Tektronix spectrum analyzer and Ubiquiti NanoBridge M5 – no signal found



8/25/15 – Second day of testing

weather: full sun, light to no wind, temperature in mid 70's

Testing potential customer location – referred to as "Test Location M" on Aug. 24, 2015
Sitting on road at this location



Using NanoBridge M5 attached to pole about 20’ above ground see picture 1 in Exhibit A
Temperature 78 degrees no wind during testing
Using scanning tool built-in to the NanoBridge M5 to search for SSID from Elsmore tower – no Kwikom SSID found