Radio Frequency Emissions Compliance Report For AT&T Mobility

Site Name:	**Bicknell Road - Elm Park**	**Site Structure Type:**	**Monopole**
Address:	**402 More Avenue**	**Latitude:**	**37.255667**
	Los Gatos, CA 95032	**Longitude:**	**-121.985298**
Report Date:	**January 5, 2023**	**Project:**	**Modification**

Compliance Statement

Based on information provided by AT&T Mobility and predictive modeling, the Bicknell Road - Elm Parkinstallation proposed by AT&T Mobility will be compliant with Radiofrequency Radiation Exposure Limits of 47 C.F.R. §§ 1.1307(b)(3) and 1.1310. RF alerting signage at the base of the Monopole and restricting access to authorized climbers that have completed RF safety training is required for Occupational environment compliance. The proposed operation will not expose members of the General Public to hazardous levels of RF energy at ground level or in adjacent buildings.

Certification

I, David C. Cotton, Jr., am the reviewer and approver of this report and am fully aware of and familiar with the Rules and Regulations of both the Federal Communications Commissions (FCC) and the Occupational Safety and Health Administration (OSHA) with regard to Human Exposure to Radio Frequency Radiation, specifically in accordance with FCC's OET Bulletin 65. I have reviewed this Radio Frequency Exposure Assessment report and believe it to be both true and accurate to the best of my knowledge.

David Charles Cotton, Jr.
Registered Professional Engineer (Electrical)
State of California, 18838

General Summary

The compliance framework is derived from the Federal Communications Commission (FCC) Rules and Regulations for preventing human exposure in excess of the applicable Maximum Permissible Exposure ("MPE") limits. At any location at this site, the power density resulting from each transmitter may be expressed as a percentage of the frequency-specific limits and added to determine if 100% of the exposure limit has been exceeded. The FCC Rules define two tiers of permissible exposure differentiated by the situation in which the exposure takes place and/or the status of the individuals who are subject to exposure. General Population / Uncontrolled exposure limits apply to those situations in which persons may not be aware of the presence of electromagnetic energy, where exposure is not employment-related, or where persons cannot exercise control over their exposure. Occupational / Controlled exposure limits apply to situations in which persons are exposed as a consequence of their employment, have been made fully aware of the potential for exposure, and can exercise control over their exposure. Based on the criteria for these classifications, the FCC General Population limit is considered to be a level that is safe for continuous exposure time. The FCC General Population limit is 5 times more restrictive than the Occupational limits.

In situations where the predicted MPE exceeds the General Population threshold in an accessible area as a result of emissions from multiple transmitters, FCC licensees that contribute greater than 5% of the aggregate MPE share responsibility for mitigation.

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Table 1: FCC Limits

Frequency (MHz)	*Limits for General Population/ Uncontrolled Exposure*		*Limits for Occupational/ Controlled Exposure*	
	Power Density (mW/cm^2)	**Averaging Time (minutes)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
30-300	0.2	30	1	6
300-1500	f/1500	30	f/300	6
1500-100,000	1.0	30	5.0	6

f=Frequency (MHz)

Based on the computational guidelines set forth in FCC OET Bulletin 65, Waterford Consultants, LLC has developed software to predict the overall Maximum Permissible Exposure possible at any location given the spatial orientation and operating parameters of multiple RF sources. The power density in the Far Field of an RF source is specified by OET-65 Equation 5 as follows:

$$S = \frac{EIRP}{4 \cdot \pi \cdot R^2} \ (\mathrm{mW/cm^2})$$

where EIRP is the Effective Radiated Power relative to an isotropic antenna and R is the distance between the antenna and point of study. Additionally, consideration is given to the manufacturers' horizontal and vertical antenna patterns as well as radiation reflection. At any location, the predicted power density in the Far Field is the spatial average of points within a 0 to 6-foot vertical profile that a person would occupy. Near field power density is based on OET-65 Equation 20 stated as

$$S = \left(\frac{180}{\theta_{BW}}\right) \cdot \frac{100 \cdot P_{in}}{\pi \cdot R \cdot h} \ (\mathrm{mW/cm^2})$$

where P_{in} is the power input to the antenna, θ_{BW} is the horizontal pattern beamwidth and h is the aperture length.

Some antennas employ beamforming technology where RF energy allocated to each customer device is dynamically directed toward their location. This analysis includes a statistical factor reducing the actual power of the antenna system to 32% of maximum theoretical power to account for spatial distribution of users, network utilization, time division duplexing, and scheduling time. AT&T recommends the use of this factor based on a combination of guidance from its antenna system manufacturers, supporting international industry standards, industry publications, and its extensive experience.

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Analysis

AT&T Mobility proposes the following installation at this location:

- AT&T MODIFICATIONS:
  - REMOVE (6) EXISTING PANEL ANTENNAS, TMAs AND DIPLEXERS FROM EXISTING MONOPOLE
  - INSTALL (9) NEW PANEL ANTENNAS ON (N) MONOPINE, TYP. (3) PER SECTOR
  - RELOCATE (3) RRU 4449 B5/B12 FROM EQUIPMENT AREA TO TOP NEAR ANTENNAS, TYP. (1) PER SECTOR
  - REMOVE (3) RRUS 12 B2 FROM EQUIPMENT AREA, TYP. (1) PER SECTOR
  - INSTALL (3) RRU 8843 B25/B66A AT TOP NEAR ANTENNAS, TYP. (1) PER SECTOR
  - INSTALL (3) RRU 4478 B14 AT TOP NEAR ANTENNAS, TYP. (1) PER SECTOR
  - INSTALL (3) RRU 4415 B30 AT TOP NEAR ANTENNAS, TYP. (1) PER SECTOR
- VERIZON WIRELESS MODIFICATIONS:
  - REMOVE (6) EXISTING PANEL ANTENNAS, TMAs AND DIPLEXERS FROM EXISTING MONOPOLE
  - INSTALL (9) NEW PANEL ANTENNAS ON (N) MONOPINE, TYP. (3) PER SECTOR
  - RELOCATE (3) RRU 4449 B5/B12 FROM EQUIPMENT AREA TO TOP NEAR ANTENNAS, TYP. (1) PER SECTOR
  - REMOVE (3) RRUS 12 B2 FROM EQUIPMENT AREA, TYP. (1) PER SECTOR
  - INSTALL (3) RRU 8843 B25/B66A AT TOP NEAR ANTENNAS, TYP. (1) PER SECTOR
- T-MOBILE MODIFICATIONS:
  - REMOVE (3) EXISTING PANEL ANTENNAS FROM EXISTING MONOPOLE
  - INSTALL (6) NEW PANEL ANTENNAS ON (N) MONOPINE, TYP.(2) PER SECTOR
  - INSTALL (3) RRUS 4480 B71+B85A AT TOP NEAR ANTENNAS, TYP. (1) PER SECTOR
  - INSTALL (3) RRUS 4460 B25+B66 AT TOP NEAR ANTENNAS, TYP. (1) PER SECTOR

The antennas will be mounted on a 75-foot Monopole with centerlines 42 feet above ground level. Proposed antenna operating parameters are listed in Appendix A. Other appurtenances such as GPS antennas, RRUs and hybrid cable below the antennas are not sources of RF emissions. Panel antennas have been installed at this site by other wireless operators. Operating parameters for these antennas considered in this analysis are also listed in Appendix A.

Figure 1: Antenna Locations

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Power density decreases significantly with distance from any antenna. The panel-type antennas to be employed at this site are highly directional by design and the orientation in azimuth and mounting elevation, as documented, serves to reduce the potential to exceed MPE limits at any location other than directly in front of the antennas. For accessible areas at ground level, the maximum predicted power density level resulting from all AT&T Mobility operations is 10.3417% of the FCC General Population limits. Based on the operating parameters in Appendix A, the cumulative power density level at this location from all antennas is 10.4566% of the FCC General Population limits. Incident at adjacent buildings depicted in Figure 1, the maximum predicted power density level resulting from all AT&T Mobility operations is 13.0919% of the FCC General Population limits. Based on the operating parameters in Appendix A, the cumulative power density level at this location from all antennas is 19.9396% of the FCC General Population limits. The proposed operation will not expose members of the General Public to hazardous levels of RF energy at ground level or in adjacent buildings.

Waterford Consultants, LLC recommends posting RF alerting signage with contact information (Caution 2B) at the base of the Monopole to inform authorized climbers of potential conditions near the antennas. These recommendations are depicted in Figure 2.

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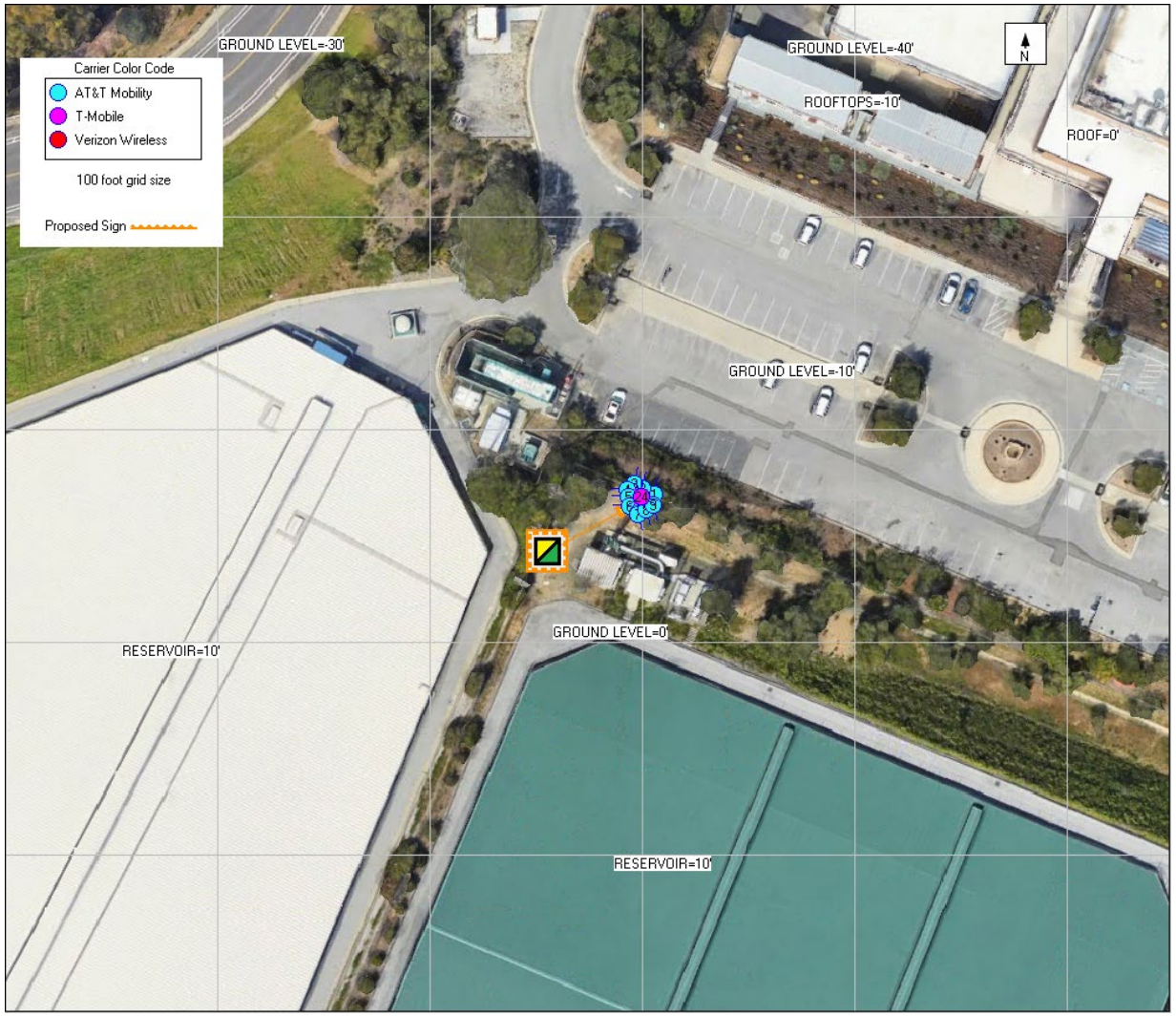
Compliance Requirement Diagram (Access Location)



Recommendations

AT&T Mobility Access Location
Caution 2B posted at the base of the tower

Materials –
1 Caution 2B Sign

Figure 2: Mitigation Recommendations

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Appendix A: Operating Parameters Considered in this Analysis

Antenna #:	Carrier:	Manufacturer	Pattern:	Band (MHz):	Mech Az (deg):	Mech DT (deg):	H BW (deg):	Length (ft):	TPO (W):	Channels:	Loss (dB):	Gain (dBd):	ERP (W):	EIRP (W):	Rad Center (ft):
1	AT&T	QUINTEL	QD4612-3D V1 02DT	700	10	0	67	4.3	40	4	0	10.0394	1615	2649	42
1	AT&T	QUINTEL	QD4612-3D V1 02DT	850	10	0	56	4.3	40	4	0	10.4057	1757	2882	42
1	AT&T	QUINTEL	QD4612-3D V1 00DT	1900	10	0	52	4.3	40	4	0	14.5888	4603	7551	42
1	AT&T	QUINTEL	QD4612-3D V1 00DT	2100	10	0	62	4.3	40	4	0	14.8781	4920	8071	42
2	AT&T	QUINTEL	QD4612-2 V1 02DT	700	10	0	68	4.3	40	4	0	10.329	1726	2832	42
2	AT&T	QUINTEL	QD4612-2 V1 00DT	2300	10	0	48	4.3	25	4	0	15.1716	3290	5397	42
3	AT&T	Ericsson	SON_AIR6449 NR TB 05.17.22 3700 AT&T	3700	10	0	11.7	2.8	86.8	1	0	23.45	19199	31497	42
4	AT&T	QUINTEL	QD4612-3D V1 02DT	700	275	0	67	4.3	40	4	0	10.0394	1615	2649	42
4	AT&T	QUINTEL	QD4612-3D V1 02DT	850	275	0	56	4.3	40	4	0	10.4057	1757	2882	42
4	AT&T	QUINTEL	QD4612-3D V1 00DT	1900	275	0	52	4.3	40	4	0	14.5888	4603	7551	42
4	AT&T	QUINTEL	QD4612-3D V1 00DT	2100	275	0	62	4.3	40	4	0	14.8781	4920	8071	42
5	AT&T	QUINTEL	QD4612-2 V1 02DT	700	275	0	68	4.3	40	4	0	10.329	1726	2832	42
5	AT&T	QUINTEL	QD4612-2 V1 00DT	2300	275	0	48	4.3	25	4	0	15.1716	3290	5397	42
6	AT&T	Ericsson	SON_AIR6449 NR TB 05.17.22 3700 AT&T	3700	275	0	11.7	2.8	86.8	1	0	23.45	19199	31497	42
7	AT&T	QUINTEL	QD4612-3D V1 02DT	700	165	0	67	4.3	40	4	0	10.0394	1615	2649	42
7	AT&T	QUINTEL	QD4612-3D V1 02DT	850	165	0	56	4.3	40	4	0	10.4057	1757	2882	42
7	AT&T	QUINTEL	QD4612-3D V1 00DT	1900	165	0	52	4.3	40	4	0	14.5888	4603	7551	42
7	AT&T	QUINTEL	QD4612-3D V1 00DT	2100	165	0	62	4.3	40	4	0	14.8781	4920	8071	42
8	AT&T	QUINTEL	QD4612-2 V1 02DT	700	165	0	68	4.3	40	4	0	10.329	1726	2832	42
8	AT&T	QUINTEL	QD4612-2 V1 00DT	2300	165	0	48	4.3	25	4	0	15.1716	3290	5397	42
9	AT&T	Ericsson	SON_AIR6449 NR TB 05.17.22 3700 AT&T	3700	165	0	11.7	2.8	86.8	1	0	23.45	19199	31497	42
10	Verizon	COMMSCOPE	NNH4-65A-R6H4 02DT	700	120	1	75	4.9	40	4	0	10.56	1820	2986	56
10	Verizon	COMMSCOPE	NNH4-65A-R6H4 02DT	850	120	0	68	4.9	20	4	0	11.22	1059	1738	56
10	Verizon	COMMSCOPE	NNH4-65A-R6H4 02DT	850	120	0	68	4.9	40	4	0	11.22	2119	3476	56
10	Verizon	COMMSCOPE	NNH4-65A-R6H4 02DT	2100	120	0	64	4.9	40	4	0	14.94	4990	8187	56
10	Verizon	COMMSCOPE	NNH4-65A-R6H4 02DT	2100	120	0	64	4.9	20	4	0	14.94	2495	4093	56
11	Verizon	COMMSCOPE	NHH-65A-R2B 01DT	1900	120	0	64	4.6	20	4	0	14.44	2224	3648	56
12	Verizon	ERICSSON	SON_AIR6449 NR TB 03.24.21 3700 VZW	3700	100	0	11	2.8	320	1	0	23.55	72469	118891	56
13	Verizon	COMMSCOPE	NNH4-65A-R6H4 02DT	700	240	1	75	4.9	40	4	0	10.56	1820	2986	56
13	Verizon	COMMSCOPE	NNH4-65A-R6H4 02DT	850	240	0	68	4.9	20	4	0	11.22	1059	1738	56
13	Verizon	COMMSCOPE	NNH4-65A-R6H4 02DT	850	240	0	68	4.9	40	4	0	11.22	2119	3476	56
13	Verizon	COMMSCOPE	NNH4-65A-R6H4 02DT	2100	240	0	64	4.9	40	4	0	14.94	4990	8187	56
13	Verizon	COMMSCOPE	NNH4-65A-R6H4 02DT	2100	240	0	64	4.9	20	4	0	14.94	2495	4093	56
14	Verizon	COMMSCOPE	NHH-65A-R2B 01DT	1900	240	0	64	4.6	20	4	0	14.44	2224	3648	56
15	Verizon	ERICSSON	SON_AIR6449 NR TB 03.24.21 3700 VZW	3700	220	0	11	2.8	320	1	0	23.55	72469	118891	56
16	Verizon	COMMSCOPE	NNH4-65A-R6H4 02DT	700	340	1	75	4.9	40	4	0	10.56	1820	2986	56
16	Verizon	COMMSCOPE	NNH4-65A-R6H4 02DT	850	340	0	68	4.9	20	4	0	11.22	1059	1738	56
16	Verizon	COMMSCOPE	NNH4-65A-R6H4 02DT	850	340	0	68	4.9	40	4	0	11.22	2119	3476	56
16	Verizon	COMMSCOPE	NNH4-65A-R6H4 02DT	2100	340	0	64	4.9	40	4	0	14.94	4990	8187	56
16	Verizon	COMMSCOPE	NNH4-65A-R6H4 02DT	2100	340	0	64	4.9	20	4	0	14.94	2495	4093	56

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17	Verizon	COMMSCOPE	NHH-65A-R2B 01DT	1900	340	0	64	4.6	20	4	0	14.44	2224	3648	56
18	Verizon	ERICSSON	SON_AIR6449 NR TB 03.24.21 3700 VZW	3700	340	0	11	2.8	320	1	0	23.55	72469	118891	56
19	T-Mobile	RFS	APXV9ERR18-C-02DT	850	0	0	80	6	25	4	0	11.9	1549	2541	30
19	T-Mobile	RFS	APXV9ERR18-C-00DT	1900	0	0	80	6	45	4	0	14.6	5191	8517	30
20	T-Mobile	RFS	APXVTM14 ALU-I20 00DT	2500	0	0	65	4.7	20	8	0	15.9	6225	10212	30
21	T-Mobile	RFS	APXV9ERR18-C-02DT	850	120	0	80	6	25	4	0	11.9	1549	2541	30
21	T-Mobile	RFS	APXV9ERR18-C-00DT	1900	120	0	80	6	45	4	0	14.6	5191	8517	30
22	T-Mobile	RFS	APXVTM14 ALU-I20 00DT	2500	120	0	65	4.7	20	8	0	15.9	6225	10212	30
23	T-Mobile	RFS	APXV9ERR18-C-02DT	850	240	0	80	6	25	4	0	11.9	1549	2541	30
23	T-Mobile	RFS	APXV9ERR18-C-00DT	1900	240	0	80	6	45	4	0	14.6	5191	8517	30
24	T-Mobile	RFS	APXVTM14 ALU-I20 00DT	2500	240	0	65	4.7	20	8	0	15.9	6225	10212	30

Notes: Table depicts recommended operating parameters for AT&T Mobility proposed operations. Co-located antenna parameters based on industry standards.

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