

August 5, 2021

Via Electronic Mail Only
corey.teague@sfgov.org

Corey Teague
Zoning Administrator
Planning Department
City and County of San Francisco
49 South Van Ness Avenue
Suite 1400
San Francisco, CA 94103

Re: **Sutro Tower – 1 La Avanzada Street – Radio Frequency ("RF") Measurements Prepared Pursuant to that certain Notice of Special Restrictions Under the Planning Code recorded in the County of San Francisco as Document 2011-J136146-00 on February 16, 2011 (the "Standard Antenna Conditions"), and those certain Conditions of Approval for DBI Permit No. 2017.09.22.9393/ Planning Department Application Record Number 2017-013308 DRM/PRJ as set forth in that certain Discretionary Review Action of San Francisco Planning Commission on July 18, 2019 (the "Repacking Conditions")**

Dear Mr. Teague:

Please find attached two reports of the recent RF exposure measurements around Sutro Tower. The first report shows the measurements undertaken during operation of Sutro Tower's main broadcast antennas which are ordinarily used; the second shows the measurements taken in the atypical situation when all auxiliary antennas are in use in lieu of the main broadcast antennas.

These studies were completed in compliance with the obligation of Sutro Tower, Inc. ("STI") to refresh the measurement of RF public exposure levels at 200 publicly-accessible sites within 1000 feet of Sutro Tower (a "200 Point Study"), as required by the Standard Antenna Conditions. Specifically, in connection with repacking requirements of the Federal Communications Commission, Bay Area television stations, including those broadcasting from Sutro Tower, coordinated their activation of new broadcasting antennas on April 29, 2020 (the "Repacking Activation"). Section B(2)(a) of the Standard Antenna Conditions and Condition D of the Repacking Conditions required STI to conduct a fresh 200 Point Study within two weeks

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of such Repacking Activation. As such, these conditions required STI to perform the 200 Point Study no later than May 13, 2020.

Due to extenuating circumstances and safety precautions during the coronavirus pandemic currently plaguing our country, STI necessarily postponed such studies in concurrence with representatives from the City of San Francisco's Department of Public Health ("DPH") and its Planning Department, as well STI's neighborhood liaisons. The measurements were taken in April of this year and the attached reports were received on July 26, 2021.

Moreover, Condition D of the Repacking Conditions requires that this particular 200 Point Study be overseen by a third party qualified Professional Engineer mutually agreed upon by DPH, STI and the neighborhood association observers proscribed for such 200 Point Study. As such, please also find enclosed this required peer review report prepared by CTC Technology & Energy and received late last week.

Copies of these reports are also being sent electronically to DPH and the designated neighborhood liaisons. Please let us know if you or anyone else would prefer a hard copy of the report for your files and we will send one immediately.

Please do not hesitate to contact me if you have any questions regarding the attached reports or Sutro Tower generally.

Very truly yours,



Kristen Thall Peters

KTP:hs
Encls.

cc: Scott Sanchez, Deputy Zoning Administrator, Planning Department
Ashley Lindsay, Planning Department
Jeff Horn, Planning Department
Patrick Fosdahl, Department of Public Health
Arthur Duque, Department of Public Health
Walter Caplan, Forest Knolls Neighborhood Association
Siu Ling Chen, Midtown Terrace Owners Association
Christine Linnenbach, Twin Peaks Improvement Association
Doris S. Linnenbach, Twin Peaks Improvement Association
Myrna Melgar, Supervisor, District 7
Raul Velez, Sutro Tower, Inc.

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Statement of Hammett & Edison, Inc., Consulting Engineers

The firm of Hammett & Edison, Inc., Consulting Engineers, has been retained by Sutro Tower, Inc. to evaluate RF exposure levels near the Sutro Tower broadcast site, One La Avanzada Street, San Francisco, California, for compliance with appropriate guidelines limiting human exposure to radio frequency electromagnetic fields.

Background Information

Sutro Tower is located near Mt. Sutro in San Francisco, California, and currently supports the main transmitting facilities for ten full-service TV stations, one low power TV station, and three FM stations. As part of the final DTV antenna installation project, Sutro Tower agreed to provide the neighborhood associations with measurement data of existing RF exposure levels at 200 locations within a 1,000-foot radius of the Tower within two weeks of the activation of any new DTV antenna, or within two weeks of any DTV antenna power increase, or every three years, whichever is earliest.* There have been a number of changes since our last measurements in 2018, as summarized in the table below:

<u>TV Station</u>	<u>2018 Channel</u>	<u>Existing Channel</u>
KRCB(TV)	Not at site	D05
KRON-TV	D38	D07
KGO-TV	D07	D12
KQTA-LD	Not at site	D14
KPKJ(TV)	D43	D27
KTVU(TV)	D44	D31
KBCW(TV)	D45	D28
KCNS(TV)	D39	D32

Prevailing Exposure Standards

The U.S. Congress requires that the Federal Communications Commission (“FCC”) evaluate its actions for possible significant impact on the environment. In Docket 93-62, effective October 15, 1997, the FCC adopted the human exposure limits for field strength and power density recommended in Report No. 86, “Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields,” published in 1986 by the Congressionally chartered National Council on Radiation Protection and Measurements (“NCRP”). Separate limits apply for occupational and public exposure conditions, with the latter limits generally five times more restrictive. The more recent standard, developed by the Institute of Electrical and Electronics Engineers IEEE C95.1-2019, “IEEE Standard for Safety Levels

* Due to the coronavirus pandemic, social distancing requirements, and shelter-in-place limitations associated therewith, Sutro Tower, Inc. was unable to meet this deadline. Accordingly, with the concurrence of the City of San Francisco Planning and Public Health Departments, as well as the neighborhood associations, the measurements were delayed.



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with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz,” includes similar exposure limits. A summary of the FCC’s exposure limits is shown in Figure 1. These limits apply for continuous exposures and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

Measurement Procedure

The site was visited by the undersigned engineer and by Mr. Scott Walthard, a qualified field technician, both employed by Hammett & Edison, Inc., during regular business hours on April 7, 2021, a non-holiday weekday, when all stations were operating from their main antennas. As required by the City and County of San Francisco, the measurements were overseen by a qualified California Professional Engineer, Dr. Andrew Afflerbach from CTC Technology & Energy.

Measurements were made at 208 locations within a 1,000-foot radius of Sutro Tower, as shown in Figure 2A, including all residential streets, and at four locations near the Twin Peaks observation area, as shown in Figure 2B. Measurements were taken at a typical spacing of about 60–75 feet along the streets, although variations occurred due to topography and street layout. Measurements were made using a Narda Type NBM-520 Broadband Field Meter with Type EF-0391 and Type EA-5091 Isotropic Broadband Electric Field Probes (Serial Nos. D-0454 and 01035, respectively). The meter and probes were under current calibration by the manufacturer.

The Type EF-0391 probe provides results in volts/meter (V/m) and is calibrated for exposure of levels down to 0.2 V/m (0.005% of the most restrictive public limit); measurement results using that instrument are expressed as a percentage of the most restrictive FCC limit (0.2 mW/cm²). The Type EA-5091 probe is capable of providing results directly as a percent of the applicable FCC exposure limit and is calibrated for exposure of levels down to 2.5% of the limit. Because this probe provides results directly as a percent of the applicable FCC limit, its results are more precise than those provided by the Type EF-0391 probe. Both probes are broadband devices, which means that they measure all radio frequency sources, not just the broadcast operations at Sutro Tower.

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The specifications of the main DTV and FM antennas, as operating during the measurements, are as follows:

Station	Channel	Effective Radiated Power	Antenna Make & Model	Center Height Above Sea Level
KRCB(TV)	D05	18.6 kW	Dielectric CBR-C2-04MBA/8H-1	496.2 m
KRON-TV	D07	50	Dielectric THV-6A7/VP-R 4C160	531.6
KGO-TV	D12	47	Dielectric THV-6A12/CP-R 4C160	544.9
KQTA-LD [†]	D14	15	RFS EPR8A470476LD3S	498.1
KPJK(TV)	D27	465	} Dielectric TUM-C5SP-14/60H-2-T-R	542.5
KPIX-TV	D29	1,000		
KTVU(TV)	D31	1,000		
KBCW(TV)	D28	1,000	Dielectric TFU-24DSC/VP-R C140 DC	516.9
KQED(TV)	D30	1,000	} Dielectric TUM-C5SP-14/60H-2-T-R	542.6
KCNS(TV)	D32	1,000		
KFSF-DT	D34	850	Dielectric TFU-26DSC/VP-R P190	523.7
KOIT(FM)	243	24.0	ERI MPX-6C-HW	511.0
KSOL(FM)	255	6.1	ERI LPX-3E-SP	440.0
KNBR-FM	283	7.1	ERI 4-bay half-wave spaced	490.0

Measurement Results

The maximum RF exposure level measured at any of the 212 locations surrounding Sutro Tower was 6.0% of the applicable FCC public exposure limit. A tabulation of measurement results at each of those locations is provided in Figure 3.

Conclusion

It is my professional opinion that the TV and FM broadcast stations at Sutro Tower continue to comply with prevailing standards for limiting public exposure to radio frequency energy.

[†] Operating at 50% power during the measurements.

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Figures

In carrying out these engineering studies, the following attached figures were prepared under my direct supervision:

1. Summary of FCC RF exposure guidelines (FCC Radio Frequency Protection Guide),
2. Map showing measurement locations,
3. Table showing measurement results.



Rajat Mathur
Rajat Mathur, P.E.
707/996-5200

July 26, 2021

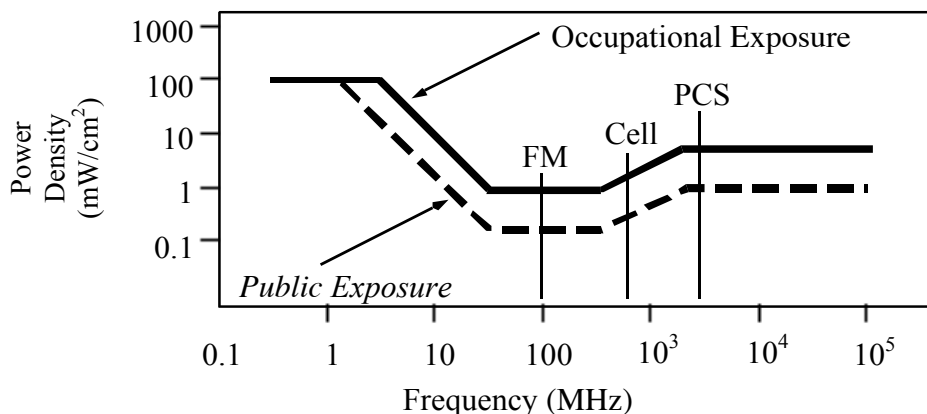


FCC Radio Frequency Protection Guide

The U.S. Congress required (1996 Telecom Act) the Federal Communications Commission (“FCC”) to adopt a nationwide human exposure standard to ensure that its licensees do not, cumulatively, have a significant impact on the environment. The FCC adopted the limits from Report No. 86, “Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields,” published in 1986 by the Congressionally chartered National Council on Radiation Protection and Measurements (“NCRP”). Separate limits apply for occupational and public exposure conditions, with the latter limits generally five times more restrictive. The more recent standard, developed by the Institute of Electrical and Electronics Engineers and approved as American National Standard ANSI/IEEE C95.1-2006, “Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz,” includes similar limits. These limits apply for continuous exposures from all sources and are intended to provide a prudent margin of safety for all persons, regardless of age, gender, size, or health.

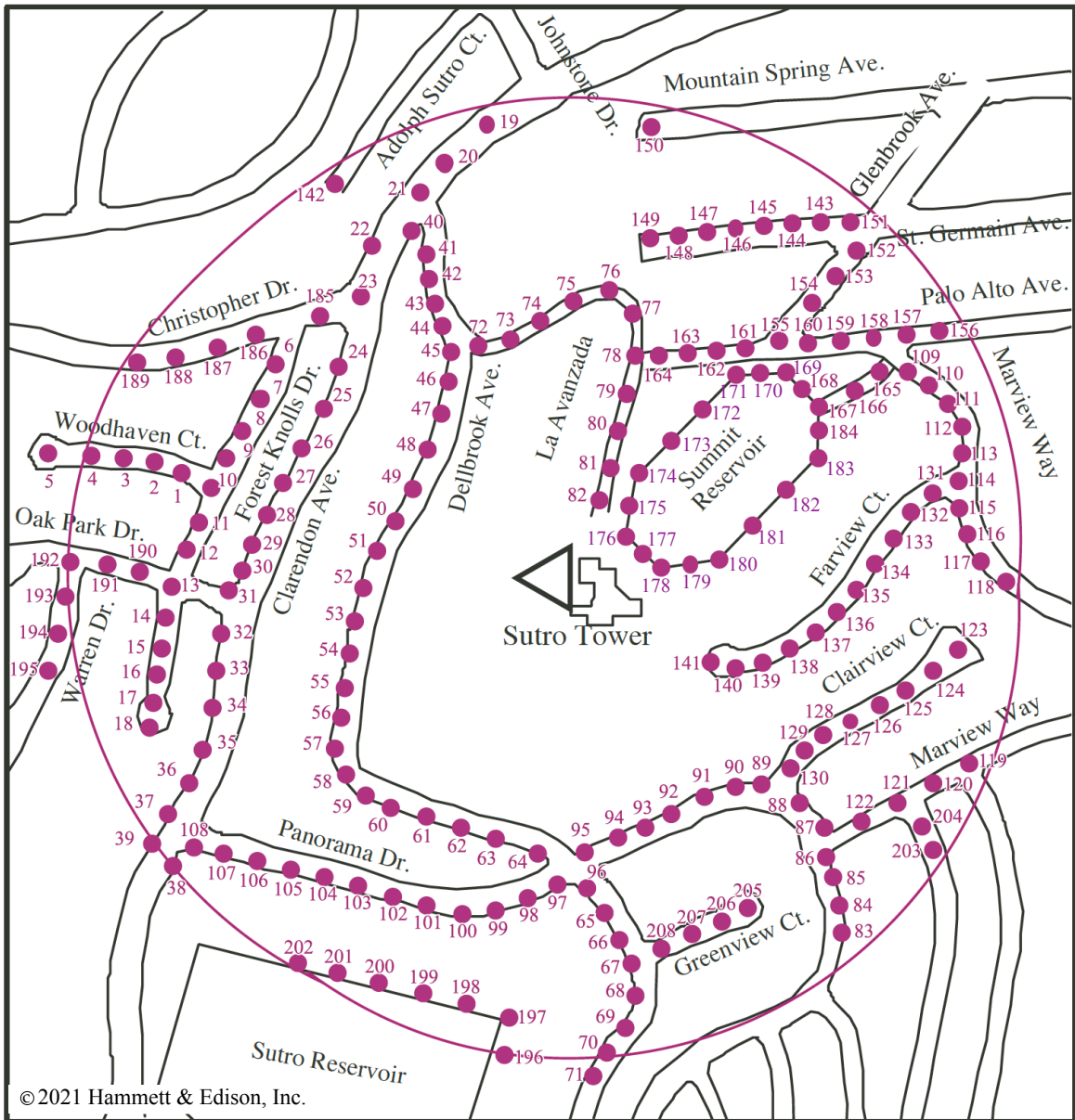
As shown in the table and chart below, separate limits apply for occupational and public exposure conditions, with the latter limits (in *italics* and/or dashed) up to five times more restrictive:

Frequency Applicable Range (MHz)	Electromagnetic Fields (f is frequency of emission in MHz)					
	Electric Field Strength (V/m)		Magnetic Field Strength (A/m)		Equivalent Far-Field Power Density (mW/cm ²)	
0.3 – 1.34	614	<i>614</i>	1.63	<i>1.63</i>	100	<i>100</i>
1.34 – 3.0	614	<i>823.8/f</i>	1.63	<i>2.19/f</i>	100	<i>180/f²</i>
3.0 – 30	1842/f	<i>823.8/f</i>	4.89/f	<i>2.19/f</i>	900/f ²	<i>180/f²</i>
30 – 300	61.4	<i>27.5</i>	0.163	<i>0.0729</i>	1.0	<i>0.2</i>
300 – 1,500	3.54√f	<i>1.59√f</i>	√f/106	<i>√f/238</i>	f/300	<i>f/1500</i>
1,500 – 100,000	137	<i>61.4</i>	0.364	<i>0.163</i>	5.0	<i>1.0</i>



Higher levels are allowed for short periods of time, such that total exposure levels averaged over six or thirty minutes, for occupational or public settings, respectively, do not exceed the limits, and higher levels also are allowed for exposures to small areas, such that the spatially averaged levels do not exceed the limits.

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Measurement Locations



Purple circle represents 1,000-foot radius from Sutro Tower.
Purple dots denote locations for measurement results in Figure 3.

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Measurement Locations



Purple dots denote locations for measurement results in Figure 3.



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Measured RF Exposure Levels
April 7, 2021

Location	Percent FCC Limit*	Location	Percent FCC Limit*	Location	Percent FCC Limit*
1	0.76	41	0.58	81	2.7
2	0.58	42	0.64	82	1.4
3	0.83	43	0.97	83	1.1
4	0.58	44	0.83	84	1.1
5	0.53	45	1.4	85	1.4
6	0.90	46	3.7	86	1.1
7	1.2	47	4.0	87	0.90
8	1.1	48	3.1	88	1.0
9	1.3	49	1.4	89	1.0
10	0.90	50	2.6	90	3.3
11	1.4	51	<2.5†	91	2.6
12	1.0	52	2.5†	92	2.5
13	0.64	53	<2.5†	93	1.7
14	0.83	54	2.2	94	1.8
15	0.64	55	1.8	95	2.0
16	0.58	56	1.9	96	0.90
17	0.53	57	2.6	97	0.97
18	0.64	58	2.0	98	0.53
19	0.34	59	2.1	99	0.97
20	0.48	60	1.7	100	0.76
21	0.76	61	1.5	101	0.76
22	0.58	62	1.5	102	1.2
23	0.83	63	0.97	103	0.90
24	1.4	64	0.97	104	0.70
25	1.9	65	1.5	105	0.30
26	1.4	66	1.1	106	1.0
27	1.0	67	1.4	107	0.58
28	1.4	68	1.1	108	0.58
29	1.4	69	0.76	109	2.3
30	0.97	70	0.43	110	1.2
31	1.6	71	0.58	111	1.2
32	1.1	72	0.30	112	1.0
33	0.70	73	0.90	113	0.70
34	0.76	74	0.34	114	0.97
35	0.70	75	0.83	115	0.76
36	0.48	76	0.43	116	1.0
37	0.34	77	0.53	117	1.2
38	0.38	78	1.0	118	1.4
39	0.58	79	2.5†	119	0.90
40	0.22	80	<2.5†	120	0.64

* Expressed as percent of most restrictive FCC limit of 0.2 mW/cm², except as noted.

† Expressed as percent of applicable public limit for frequencies involved; Type EA-5091 probe used.



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Measured RF Exposure Levels
April 7, 2021

Location	Percent FCC Limit*	Location	Percent FCC Limit*	Location	Percent FCC Limit*
121	0.58	161	1.0	201	0.53
122	0.58	162	0.43	202	0.25
123	1.2	163	1.8	203	0.90
124	1.1	164	1.4	204	0.64
125	1.1	165	2.0	205	1.4
126	1.6	166	1.8	206	1.4
127	1.5	167	1.3	207	1.5
128	1.3	168	1.6	208	2.0
129	1.2	169	1.5	209	1.8
130	1.1	170	1.8	210	5.0†
131	1.8	171	1.7	211	4.0
132	1.2	172	1.4	212	2.0
133	1.2	173	2.8		
134	1.2	174	4.3		
135	1.9	175	3.3		
136	2.7	176	4.2		
137	3.2	177	2.7		
138	3.1	178	1.6		
139	1.6	179	4.2		
140	2.3	180	5.0†		
141	2.5	181	4.5†		
142	1.1	182	6.0†		
143	0.97	183	6.0†		
144	1.1	184	1.9		
145	0.97	185	0.83		
146	0.76	186	0.58		
147	0.90	187	0.76		
148	1.4	188	0.43		
149	1.0	189	0.58		
150	0.76	190	0.58		
151	0.70	191	0.48		
152	1.1	192	1.6		
153	1.2	193	0.34		
154	2.0	194	0.43		
155	0.48	195	0.48		
156	2.5	196	0.50		
157	2.0	197	0.28		
158	1.9	198	0.33		
159	1.4	199	0.33		
160	1.7	200	0.37		

* Expressed as percent of most restrictive FCC limit of 0.2 mW/cm², except as noted.

† Expressed as percent of applicable public limit for frequencies involved; Type EA-5091 probe used.

