

Impacts

If the No Project Alternative was implemented, some of the impacts associated with the project could occur while others would be avoided. Sutro Tower would continue as a visible presence in the neighborhood. It would continue to operate and to emit existing levels of RFR into the vicinity of the Tower, until such time as the FCC decides to discontinue NTSC television broadcast signals.

It is unknown whether operation of the radio stations alone would be able to pay the operating costs of Sutro Tower. The possibility exists that once the NTSC television broadcasts cease, Sutro Tower would be utilized for other permitted communication uses or would shut down. Effects from demolishing the tower may then result.

On-site impacts would temporarily be less at Sutro Tower if the DTV antennas were not added to the tower. Temporary installation noise impacts would not occur on the Sutro Tower site, nor would installation impacts due to traffic and air quality. Temporary construction jobs for installing the antenna would also not occur.

No impacts would occur due to operation of either this alternative or the project on the following: land use, population, transportation, noise, air quality, public services and utilities, biology, water, hazardous materials, energy, geology, seismicity and soils, cultural resources, and growth inducing effects. (please refer to Figures 6 to 9 in Section 3.2.2, Visual Quality Effects, pages 3-29 to 3-32), would not occur with this alternative.

If Sutro Tower was not utilized for any other communication use, RFR emissions would be less with this alternative, than with the proposed project. If Sutro Tower was reutilized for other permitted communication uses with this alternative, then RFR emission could be the same as from the DTV project, increase, or decrease, depending upon the technological use. If Sutro Tower was to be demolished, then the emission of RFR would be less with this alternative.

Project Sponsor's Reasons for Rejection

This alternative was rejected by the project sponsor because it would not attain the project's fundamental objective, of preparing Sutro Tower to provide concurrent DTV and NTSC broadcast signals in an effort to comply with FCC rules. In the sponsor's opinion, the television stations would cease operating at Sutro Tower once the NTSC signals were no longer broadcast, and San Francisco would no longer be the primary city of license for the television stations. In the event that the No Project Alternative is implemented, in order to follow FCC rules, an alternative site would need to be chosen and a new broadcast tower would likely need to be constructed. Please refer to Section 6.3 below for the sponsor's reasons for rejecting an off-site alternative.

6.3 OFF-SITE ALTERNATIVES

Regulatory Framework / Description

FCC Rules, Section 73.685(b) states that "Location of the antenna at a point of high elevation is necessary to reduce to a minimum the shadow effect on propagation due to hills and buildings which may reduce materially the intensity of the station's signals. In general, the transmitting antenna of a station should be located at the most central point at the highest elevation available The location should be so chosen that line-of-sight can be obtained from the antenna over the principal community to be served"

Due to the nature of radiofrequency, antennas broadcasting television signals need to be sited at relatively high locations. Television signals follow a virtual line-of-sight path from broadcasting antenna to television receiver. Especially at UHF frequencies, these signals do not readily bend around solid obstacles. Thus any hills or highrise building between the antennas and the receivers (television sets) would impair, and possibly block reception of the broadcast signals.

Television antennas tend to be located at the highest natural site close to the city of license so that the television broadcasts can be received by television sets. The FCC requires that a certain level of service be maintained in the city of license (FCC Rules, Section 73.685(a)). No major obstructions may exist in the path of the broadcast signal, and service to the city must be

by direct signal. Relays or booster facilities may not be used to achieve the required level of service.

In the San Francisco Bay Area, three of the highest sites are currently used for television broadcasting: Sutro Tower, San Bruno Mountain, and Mount Diablo. In addition to a relatively high natural site, towers are usually constructed from which the television signals can be broadcast. The towers help to insure that receivers (televisions) would not have reception blocked due to hills or highrise buildings. Signals broadcast from Sutro Tower, San Bruno Mountain, and Mount Diablo are not interchangeable because of their distance from each other and the cities of license.

New DTV channel allotment rules specify that each station's DTV transmitting antenna location must be within 5 kilometers of the existing NTSC transmitter sites (FCC Rules, Rules, Section 73.622(d)(1), 47 C.F.R. Section 73.622). Exemptions apply to this rule which may be used for alternatives located farther than 5 kilometers, if an engineering study can show that there will be no additional interference to any other station.

Regarding the Mount Diablo alternative, currently Channel 42, which is licensed to Concord, and Channel 64, which is licensed to Stockton, are the only two television broadcast stations on Mount Diablo. Signals from Mount Diablo would come into San Francisco at about a 2° angle, while signals from Sutro Tower arrive from at about 4° to about 90° making the signals more likely to be received without blockage within San Francisco. Mount Diablo would not be an acceptable alternative location for the DTV antennas because some Sutro Tower stations cannot broadcast from that site without interfering with signals from Sacramento stations and thereby may violate FCC non-interference requirements. In addition, Mount Diablo would not be an acceptable alternate location for the DTV antennas because Oakland and other East Bay cities would be shadowed from direct reception of signals broadcast from Mount Diablo.

Regarding a San Bruno Mountain alternative, because of proximity of San Bruno Mountain to the San Francisco International Airport, the tower heights for the antennas are limited to 325 feet due to concerns by the Federal Aviation Administration (FAA). NTSC broadcasts from San Bruno Mountain would therefore be unable to adequately serve San Francisco residents for all television stations. (Watson, 1997) A map in a report from John F.X. Browne &

Associates, shows that residents on the far side of Mount Sutro would not be able to receive NTSC Broadcasts for one of the three stations analyzed. (Browne, 1993). This same report shows that for these three stations, DTV signals from San Bruno Mountain would be able to serve all of San Francisco.

Because antennas on San Bruno Mountain could not adequately broadcast NTSC signals to all neighborhoods of San Francisco, NTSC broadcasts would continue from Mount Sutro under this alternative until NTSC broadcasts were stopped by the FCC, while DTV signals would be broadcast from San Bruno Mountain. This could entail each of the television stations to have additional personnel and test equipment monitoring the broadcasts.

This alternative would include construction of one or more approximate 325-foot tall towers in the vicinity of the existing broadcasting tower on San Bruno Mountain on which DTV antennas would be installed.

Mount Davidson and Twin Peaks were ruled out as possible alternative sites due to potential land use conflicts, and also because it was determined not be practicable to demolish Sutro Tower and construct another tower at a new location so close to the existing site.

Impacts

If the DTV antennas were installed on San Bruno Mountain, then the television stations now broadcasting from Sutro Tower would likely move their NTSC antennas to the same new location for cost savings of personnel, and/or they would possibly remove them after the FCC no longer required dual broadcasts of DTV and NTSC signals. Thus eventually Sutro Tower could have no television stations broadcasting signals, only the radio stations. It is unknown whether operation of the radio stations alone would be able to pay the operating costs of Sutro Tower. The possibility exists that once the NTSC television broadcasts ceased, that Sutro Tower would be utilized for other permitted communication purposes or shut down. Effects from demolishing the tower could then result.

If an off-site alternative was constructed and implemented, impacts identified for the proposed project at Sutro Tower would instead occur at the alternative site location. For example on

San Bruno Mountain, new towers would need to be constructed, while at Sutro Tower the existing tower could remain in use.

All on-site construction-related impacts identified for the Sutro Tower area under the proposed project would instead be experienced at the alternative location on San Bruno Mountain. There would also be temporary construction impacts for building a new tower or towers on San Bruno Mountain. Temporary installation noise impacts would not occur on the Sutro Tower site, nor would installation impacts due to traffic and air quality. Temporary construction jobs in San Francisco installing the antenna would also not occur.

No impacts would occur due to operation of either this alternative or the project on land use, population, transportation, noise, air quality, public services and utilities, biology, water, hazardous materials, energy, geology, seismicity and soils, cultural resources, and growth inducing effects. Visual changes to the tower (please refer to Figures 6 to 9 in Section 4.3, Visual Quality Effects, pages 3-29 to 3-32), would not occur with this alternative.

Near the likely site of a new tower at San Bruno the maximum RFR levels would rise from about 22.7 to 34.4 percent of the *FCC 96 Guidelines*, an increase of 11.7 percent of the guidelines. This contrasts with the increase in maximum RFR levels near Sutro Tower from 12.7 to 14.3 percent of the *FCC 96 Guidelines*, an increase of 1.6 percent of the guidelines. San Bruno Mountain is surrounded by public open space, and residential land uses are not located as close as for Sutro Tower.

Other impacts associated with tower construction and/or antenna installation would also occur on the alternative site. These impacts would be temporary, and would likely fall within the range of impacts typically associated with small- to medium-scale construction projects. Long-term visual impacts would not be substantial since other towers and antennas already existing on San Bruno Mountain.

Impacts related to the project would not occur at Sutro Tower with this alternative. In addition, San Francisco would have no jurisdiction over this alternative.

Project Sponsor's Reasons for Rejection

This alternative was rejected by the project sponsor because it would not attain the project's fundamental objective, of preparing Sutro Tower to provide concurrent DTV and NTSC broadcast signals in an effort to comply with FCC rules. The project sponsor further believes that it would not be possible to satisfy the project objective by attempting to implement Digital Television at an alternate project site for the following reasons among others:

1. Consistent with the FCC's finding in its initial authorization of the existing Sutro Tower site, there is no equivalent alternative site for relocation of this large group of San Francisco-based television stations, and any alternative sites are inferior in their suitability for television broadcasting by San Francisco stations due to: (1) inability to provide adequate facilities for all ten TV stations now at Sutro Tower; (2) being non-centrally located; (3) being at lesser relative elevation; (4) providing lesser household coverage over the geographically varied terrain of the San Francisco area due to signal blocking, degradation and reflection by surrounding land forms; and (5) presenting greater potential hazards to airspace navigation.

In this connection, the Sutro Tower location for the ten existing Sutro Tower, Inc. stations optimally satisfies the FCC's transmitter location specifications, as set forth in Section 73.685(b) of the FCC's Rules:

“Location of the antenna at a point of high elevation is necessary to reduce to a minimum the shadow effect on propagation due to hills and buildings which may reduce materially the strength of the station's signals. In general, the transmitting antenna of a station should be located at the most central point at the highest elevation available. To provide the best degree of service to an area, it is usually preferable to use a high antenna rather than a low antenna with increased transmitter power. The location should be so chosen that line-of-sight can be obtained from the antenna over the principal community to be served; in no event should there be a major obstruction in this path. The antenna must be constructed so that it is clear as possible of surrounding buildings or objects that would cause shadow problems. It is recognized that

topography, shape of the desired service area, and population distribution may make the choice of a transmitter location difficult.”

2. The FCC’s DTV implementation plan contemplates the interim, temporary concurrent broadcasting of both DTV and NTSC signals by television stations for a short period of years, followed by the termination of NTSC television program broadcasting in favor of DTV-only television broadcasting. Thus, location of DTV broadcasting at an alternative site could render Sutro Tower useless within a few years for its principal function of television broadcasting depriving Sutro Tower, Inc. of its substantial property and investment value.
3. Even if there was an adequate or satisfactory alternate site, which in the sponsor’s opinion there is not, to locate the DTV broadcast operation of Sutro Tower, Inc. television stations at the alternative site would require numerous regulatory, legal and construction-related approvals, activities and resulting delays, including but not limited to the following: (1) each individual television station would need to engineer the alternate location, apply for an FCC license at that location, secure necessary land use permits and approvals and other local, state, and federal permits, licenses and authorization; and (2) a new broadcast tower or towers would need to be designed, permitted, approved, and constructed.

It is unlikely that these activities could be undertaken and completed in the short time frame specified by the FCC for DTV broadcasting to begin, therefore forcing Sutro Tower, Inc.’s San Francisco television broadcast stations to violate the FCC’s DTV implementation rules and requirements. When the Sutro Tower project itself was first undertaken in the 1960s, the time consumed in the permitting, approval and construction process extended for many years, and it was not until 1973 that actual broadcasting was able to begin at Sutro Tower. Given the evolution of land use law and regulation since that time, and the possible need for more than one additional tower at more than one alternative site to be constructed, the time to complete such a project now could only be substantially greater.

In addition, DTV studies indicate that the greatest national impediment to stations’ compliance may be the need for construction of new broadcast towers for DTV use

where needed, because there are over 1,500 U.S. full power TV stations operating, but fewer than five tower contractor companies in the U.S. which are technically capable of building tall TV towers. Sutro Tower, Inc.'s project objective eliminates any need for new tower construction, whereas any project alternative is expected to require new construction and thus this additional substantial delay with likely resulting FCC rule violations as to the DTV deadlines.

4. Providing for DTV implementation at Sutro Tower as contemplated by the sponsor's intended project will not require the construction of any new tower, nor any increase in the height of the existing tower. Rather, it will require only the attachment to the existing tower of a single, integrated stack antenna for all DTV stations, and related tower strengthening and reinforcement to accommodate the additional antenna mounting. In contrast, as noted, any alternative site for the project will likely require the construction or substantial enlargement of tower facilities at the alternative sites(s). Thus any project alternative would, in its elf, necessarily create substantially greater environmental impacts than the modest modification required for Sutro Tower to accommodate the new DTV antenna unit.

REFERENCES

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John F.X. Browne & Associates, "HDTV Coverage Analyses San Francisco Market," July 1993.

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APPENDIX A:
RADIOFREQUENCY LEVELS

**Sutro Tower, Inc.
San Francisco, California**

**Engineering Analysis of
Radio Frequency Exposure Conditions
with Addition of Digital TV Channels**

January 3, 1997

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Statement of William F. Hammett, Consulting Engineer

The independent consulting firm of Hammett & Edison, Inc., Consulting Engineers, has been retained on behalf of the City and County of San Francisco to evaluate the impact on people of radio frequency (“RF”) exposure resulting from the addition of new digital television (“DTV”) antennas at Sutro Tower.

Background

Sutro Tower is the best TV broadcasting site in San Francisco. Signals from the 10 TV stations located there reach all areas of San Francisco and most of the surrounding counties, too. There are also 4 FM radio stations located at Sutro Tower, plus a few low-power radio facilities. The broadcast stations are summarized in the attached Figures 1A and 1B.

Allowable Exposure to RF Energy

The U.S. government has set limits on the amount of RF energy that people can be exposed to. Those limits* are based on decades of research by hundreds of researchers from universities, government programs, our military, and private companies. Basically, a level of RF energy was found that caused monkeys and apes to stop their trained exercises and to go to areas with lesser amounts of the energy. The standards for human workers have been set 10 times tighter than what first affected monkeys and apes, and the standards for the public have been set about 50 times tighter. All the studies in this report are based upon the tighter, public levels.

Another important part of the government limits is that there was no “cumulative” effect of RF energy. So long as levels do not exceed the levels that bothered monkeys and apes, it made no difference whether you got a lot or a little RF energy, or whether you got it for a little while or for a long time.

How the Stations Work

In order for the stations to reach people’s radios and TV sets, they must send out energy. Each station sends out energy on its own frequency, assigned by the government. Microwave ovens use similar frequencies, but they concentrate the

* Derived from the NCRP Report No. 86 (1986) and the ANSI/IEEE Standard C95.1-1992.

energy onto the food put into them. Broadcast stations are different; they spread out the energy, to reach as many people as possible, each with just a little bit of the energy. Radios and TV sets are very sensitive and do not need much energy to pick up the stations' signals.

What is Digital Television

Digital Television (“DTV”) is a new TV channel that the government is requiring all TV stations to add, if they want to stay in business. Eventually, all TV stations are supposed to give back to the government the channel they have now. Unfortunately, the TV sets you have now will pick up the DTV channel but will not be able to de-code the DTV signal, so you will have to buy new TV sets. The stations at Sutro Tower want to use the Tower for their new DTV signals, too. They plan to add a long antenna onto one side of the Tower, for all the stations to use.

The government has not yet decided how much power the new stations can have. For doing these studies, we have assumed higher power levels than could probably be installed, so that the results will be good no matter what the government finally decides.

Calculations

Calculating the total energy from the stations at Sutro Tower is easy for a computer to do. By telling it how the different stations operate,[†] the computer will answer with numbers for the energy at any particular point in San Francisco. Doing this for the stations there now, we find that the stations meet the federal exposure limits at all locations. Figure 2 is a map of the levels for the existing TV and FM stations at Sutro Tower, calculated as a percentage of the government limits and shown by particular shades or colors. The energy from the stations does not go over the government limits, as shown by the lack of any red coloring on the map.

The computer can also tell us what happens when the stations add their DTV signals, too. Figure 3 is a map of this case. Again, the energy from the existing stations plus the new DTV channels does not go over the government limits, as shown by the lack of any red coloring on this map.

[†] The position and type of the transmitting antenna on the Tower, the power it sends out, and the frequency of the station. See the Appendix for a more detailed description.

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Figure 4 is a print-out of the actual numbers for both cases, which can be used to find the calculated number for locations within about 2 kilometers of Sutro Tower. From Figures 3 and 4 can be derived the following table that shows the approximate energy levels at certain distances from Sutro Tower. These are about the same whether or not the DTV channels are included:

<u>Approximate Power Density</u>	<u>Approximate Distance from Sutro Tower</u>
< 0.5%	more than 1.8 km (about 18 city blocks)
0.5 – 1%	less than 1.8 km (about 18 city blocks)
1 – 5%	less than 0.9 km (about 9 city blocks)
5 – 10%	less than 0.2 km (about 2 city blocks)
>10%	less than 0.1 km (about 1 city block)
>100%	does not reach any publicly accessible areas

Measurements

The computer program is supposed to give high, “worst-case” numbers. This way, we can be sure that, if the program says it’s OK, it will be, at least for the Sutro stations. We have checked this by visiting some locations in San Francisco and comparing the measurements to the numbers in Figure 4. We used a meter specially designed for this purpose[‡] and a representative from the San Francisco Department of Public Health came along to watch. The data in Figure 5 shows that, at all the locations we measured, the actual numbers were always less than what the calculations had said. Therefore, we would expect that the calculations when the stations add their DTV channels will also remain less than the calculations and less than the government limit.

Auxiliary Operation

Most of the stations at Sutro Tower have “stand-by” auxiliary antennas on the Tower, too, so that they can continue to serve the public if something bad should happen to their main antennas on top of the Tower or if work needs to be done on those antennas. The auxiliary antennas are mounted mostly at the first rung of the Tower and generally can only put out a fraction of the power of the main antennas. Because of these differences, the energy from them in the neighborhoods near Sutro Tower is different,

[‡] Holaday Instruments Broadband Exposure Meter, Model HI-3004, calibrated on October 14, 1996.

too. In some cases, it is less and sometimes it is more. In all cases, though, the total RF energy is less than what the standards would allow.

Conclusion

The stations operating from Sutro Tower do not generate RF energy in excess of the federal limits in publicly accessible areas. On that basis, there is presumed to be no health risk for persons who live or work nearby or in any other part of San Francisco as a result of the Tower and the operation of its tenants.

The same study methods show that the addition of Digital Television channels at Sutro Tower also will not generate RF energy in excess of the federal limits. Finally, the stations at Sutro can not vary their power very much, nor increase power, so there is no point in measuring the RF energy levels from Sutro more than once, after the DTV stations are added, until such time as other changes might be made.

Attachments

The following attached figures were prepared under my direct supervision:

1. Summary of stations at Sutro Tower
2. Map of RF levels for existing stations
3. Map of RF levels for existing stations plus DTV channels
4. Table of values from Figures 2 and 3
5. Measurement data and comparison with calculations.

For more information, there are appendices describing the FCC exposure standard and computer program:

Appendix A. Summary of NCRP#86 guidelines

Appendix B. Description of calculation methodology.

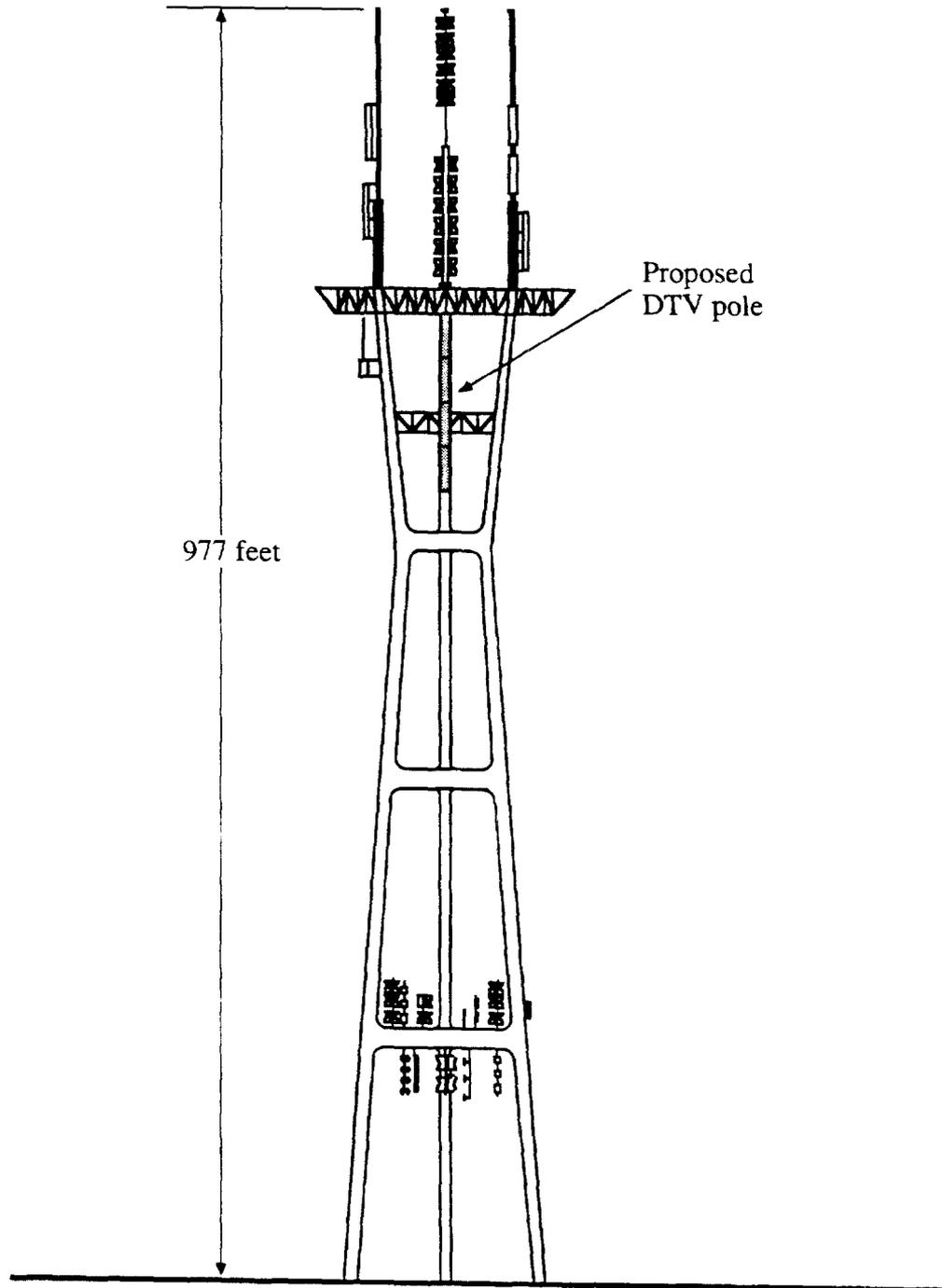


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Proposed Tower Configuration,
showing Broadcast Antennas



View Looking West