

RF SAFETY GUIDELINES

OVERVIEW

Compliance with applicable Federal Communications Commission (FCC) and Occupational Safety and Health Administration (OSHA) rules and regulations is paramount to our company's success in the media industry and is reinforced in our business conduct statement under the Health, Safety and Environmental (HSE) Policy Section.

Major radio frequency (RF) transmitting facilities under the jurisdiction of the FCC, such as radio and television broadcast stations, are required to undergo routine evaluation for RF compliance whenever an application is submitted to the FCC for construction or modification of a transmitting facility or renewal of a license.

SCOPE

The RF exposure guidelines adopted by the FCC are the foundation of the regulatory requirements for FCC-licensed services and have been adopted by OSHA.

The FCC has defined permissible exposure limits in terms of two broad categories:

- Accessible/Uncontrolled Areas – Areas in which the general public may be exposed or persons who are exposed as a consequence of their employment. These persons may not be fully aware of the potential for exposure and/or cannot exercise control over their exposure.
- Occupational/Controlled Areas – Areas in which persons may be exposed as a consequence of their employment. These persons who are exposed are fully aware of the potential for exposure and can exercise control over their exposure.

The amount of RF energy exposure to the public or workers as a result of broadcast antennas depends upon several factors, including the type of transmitter antenna, the design of the antenna, power transmitted to the antenna, height of the antenna, frequency, and distance from the antenna. In addition to the possibility of receiving exposure to high field strengths, workers might also be in areas which are susceptible to spark discharge and sustained contact with the current.

REQUIREMENTS

All broadcast locations must have a written RF Safety Plan. The basic Plan components must include:

- A written plan describing each part of the compliance program, an inventory of the RF sources, the preferred communication means, both on- and off-site, and the designated site RF safety officer.
- Warning signs and recommended procedures for informing people with pace makers and other metal implants and medical devices.
- Training for all persons commensurate with their level of activity, i.e. accessible/uncontrolled areas and occupational/controlled areas.
- A communications plan to immediately inform and update employees when any new changes occur to ensure they are following the proper procedures for maximum protection. An example would be the proper placement of RF warning signs.
- A site map which identifies the RF hazard areas. The site map must be immediately updated whenever changes to the antenna systems are made. This is especially important when other media services or users co-exist on the building roof or tower structure and/or contractors may be required to work in these altered locations.
- Mitigation procedures to resolve any RF hazard condition and to minimize any RF radiation exposure.

Regulatory Standards and Good Practice Guidelines

Consensus standards and government guidelines have been developed to limit exposure times and energy levels.

The American Conference of Governmental Industrial Hygiene (ACGIH) provides

guidelines known as Threshold Limit Values (TLVs) which limit exposure to RF and restrict whole body and partial body irradiation for a six-minute averaging time.

The TLV refers to RF and microwave radiation in the frequency range of 30 kHz to 300 GHz and represents conditions under which it is believed nearly all workers may be repeatedly exposed without adverse health effects.

OSHA addresses acute exposure to RF radiation in the General Industry Standard (1910.97) and indirectly by utilizing the FCC exposure guidelines. OSHA uses the General Duty Clause, which states that an employer “shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees” to enforce compliance.

For normal environmental conditions and for incident electromagnetic energy of frequencies, OSHA guidelines cover 10 MHz to 100 GHz. The radiation protection guidelines limit the power density measurement at 10 mW/cm² (milliwatts per square centimeter) as averaged over any possible 0.1-hour period or 6 minutes. This mandatory guideline applies whether the radiation is continuous or intermittent. These formulated recommendations pertain to both whole body irradiation and partial body irradiation. Another limiting term may be expressed as Energy Density of 1 mW-hr./cm.² (milliwatt hour per square centimeter) during any 0.1-hour period.

In an updated guideline, the FCC specified levels of RF fields based on the frequency wavelength of the signal above which exposure times must be limited. The Maximum Permissible Exposure (MPE) limit for RF energy is based on exposure time, and the energy levels at a given wavelength. As long as the general public or the RF worker does not exceed the MPE for the specific averaging time, induced body heating and cell damage is not expected to occur. For example, at 30 MHz the MPE for the general public is 0.2 mW/cm² for 30 minutes averaging time. At 30 MHz for an occupational RF worker, the MPE is 1.0 mW/cm² for 6 minutes averaging time.

The FCC requires that licensees of all transmitting facilities certify that the MPE limits are met. In determining whether a facility meets the FCC requirements, these steps should be followed:

- Determine if the station is categorically excluded from a routine evaluation. Categorically excluded stations are not exclusions from compliance, but an exclusion from performing routine evaluations to demonstrate compliance. Even if all antennas at the site are categorically excluded, the site may not be in compliance, as the total RF output from all transmitters may be in excess of the FCC limits.
- If not categorically excluded, perform a Routine Environmental Evaluation. To conduct the evaluation, the RF output of all transmitters, antennas, towers, etc. must be determined to ensure the total is below the MPE for accessible/uncontrolled areas and occupational/controlled areas.
- If the site is not in compliance based on the Routine Environmental Evaluation, a re-evaluation must be performed to

determine the feasibility of implementing the use of warning signs and other restrictions, i.e. fences, floor markings, shields, etc. to limit access to high RF field areas.

- Reliance on averaging is not recommended when establishing basic control strategies as it obligates the employer to time the employee's access and activity to limit exposure.
- If a site cannot be brought into compliance with warning signs and other means of restriction, a full environmental analysis must be performed and corrective engineering and administrative actions must be implemented.
- A site environmental analysis is a complete and thorough study which includes a site survey, field measurements, and predictions. Included in the evaluation is an on-site survey of RF field measurements and the data required to perform RF predictions. A detailed dimensional drawing of the rooftop will be done to note the location of each antenna and photographs of the layout will be taken. Field measurements will document the current RF field levels for the current antennas and a means of easily reanalyzing the site when additional antennas, transmitters, frequencies, carriers, and/or modifications are made at the site which change the RF field levels.

RESPONSIBILITIES

Roof top areas or towers where the RF power densities equal or exceed the controlled or uncontrolled levels shall be identified. Sites having sources not categorically excluded from routine RF evaluation must be analyzed to determine the boundaries of the occupational/controlled and accessible/uncontrolled areas using the basic procedures in the FCC guidelines. When power densities exceed the accessible/uncontrolled MPE, every effort shall be made to prevent access to such areas by personnel not trained in RF awareness. If access cannot be prevented, then appropriate signs must be posted to alert the general public/personnel of the potential hazard. In areas where power densities may or do exceed the occupational/controlled MPE in accessible areas at a site, any personnel entering the area must be trained in RF awareness. To ensure that workers know when they may be subject to high RF levels, the areas must be identified by:

- A permanent boundary utilizing signs and floor markings must be in place in hot spot areas where power densities could exceed the occupational/controlled MPE limits.
- A minimum safety zone of at least three feet from any radiating device must be established. High power/low gain antennas can produce high RF fields demanding a larger safety zone.
- Transmitting, transmitting or receiving, and receiving only dishes (antennas) must be appropriately marked to aid in recognizing potential energized RF sources.

The RF hazard area shall be clearly marked with appropriate signs, barricades, floor markings, etc. such that any worker who has access to the facility will be alerted not to occupy the hazardous locations. Signs shall be of standard design and shape and of

sufficient size to be recognizable and readable from a safe distance.

At a minimum, once hot spots have been identified, signs shall be posted to warn workers of the potential for exposure to high RF fields and the need to take steps to minimize exposure in those areas. Also, a sign shall be posted at the door entrance into the area of high RF fields to alert anyone entering the area that personal monitoring devices must be used. The RF Safety Plan must be updated when changes occur.

Only duly authorized and trained persons should have access to any area at the site where RF fields could cause exposures that could exceed the FCC accessible/uncontrolled limits. Local management must provide direction and define:

- How to control access
- Limit area for only authorized personnel
- Redundant warning by affixing the proper number of signage
- Reporting procedure and written emergency information
- Role of building/tower owner or manager
- Potential role of a competent third-party or specialized site manager if necessary.

At multiple user/rooftop based sites, it may be useful to establish an agreed-upon controlled environment which is made up of only a portion rather than the entire roof top. This would make it possible for other activities, such as building repairs and servicing air conditioning units by contractors who have not had RF awareness training, to take place on the accessible/uncontrolled areas of the roof.

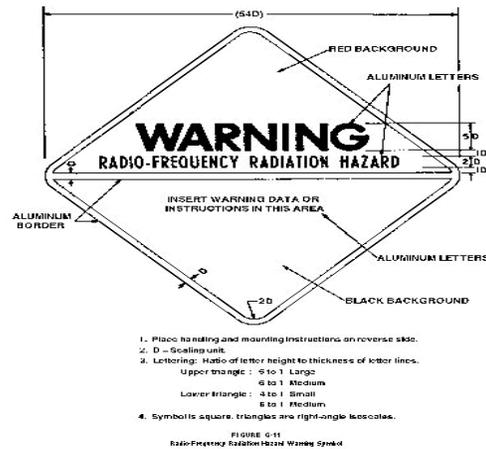
The occupational/controlled areas (areas where exposures could equal or exceed the general public MPE limits) can be limited to a specific, demarcated portion of the rooftop. Workers who have not undergone awareness or other RF-related training may work only in those areas that have not been restricted, as long as effective measures are in place to keep workers away from occupational/controlled areas.

Controlling the means of ingress onto the roof or site by key access or locked doors may be supplemented by the installation of an alarm system monitored by site security. Signs should be placed at prominent and distinctly visible areas alerting any person to the potential of RF hazards. Place signs and ANSI-approved hazard floor markings at the base of all towers providing necessary alert information. It is important to provide information about who to contact regarding the site or an individual transmitter or antenna. The building/tower owner or site manager must be contacted for permission to enter an area and to receive specific instructions or guidance before working on site.

Building/tower owners and managers may not be subject to FCC enforcement if they do not hold an FCC license. However, their employees may be subject to enforcement of workplace safety rules by OSHA.

On multi-transmitter sites, a competent site manager can simplify or streamline the overall RF compliance process for all licensees with antennas at the site through such means as developing and enforcing site access procedures; identifying possible hot spots; coordinating and enforcing worker safety practices; maintaining technical and operational data for all transmitters and antennas in service at the site; and providing the actual site certification.

OSHA Standard 1910.97(a) (3) titled Warning Symbol, requires the following sign to be posted:



The fundamental safety measures for servicing an antenna should be to deactivate the unit. Other appropriate hazard avoidance measures may be necessary on a case-by-case basis. The following procedure should be followed at all times at a transmitter site:

- Deactivate the antenna being serviced and take into consideration any multi-user situations at nearby antennas which may cause workers to be subjected to RF levels above the recommended MPE.
- Lockout/tagout procedures (29 CFR 1910.147) should be utilized on the transmitter as required. In some low power directional antennas, minor adjustments can be performed from the rear of the antenna without subjecting the service personnel to fields that are in excess of the guidelines.
- Evaluate the shielding on the transmitter power amplifiers, which is designed to contain RF energy and to prevent excessive RF fields in the immediate vicinity of the transmitter, to ensure they are working properly. After maintenance or repair work, the shielding must be replaced immediately.

- Limit duration of exposure. Personal RF monitors are recommended for use in the vicinity of both the transmitter and antennas to ensure that exposure guidelines are not exceeded.
- Antennas in the equipment room shall not be activated. Testing of transmitters should be done with the transmitter connected into a dummy load or with the transmitter connected to an antenna that is a safe distance from any personnel.
- When workers must climb a tower to perform maintenance (painting, repairs, and beacon replacement), they are necessarily too close to the antennas. It is preferable to deactivate any antenna that the worker must pass while climbing the tower. A tower may contain multiple, stacked radio and television transmitting antennas and may be located on tall buildings in urban areas. The worker should be alerted not to stop at any point on the tower that is in the major beam of any active antenna. Personal monitors should be worn. In extremely high RF field areas, workers should consider wearing RF protective clothing.
- The fall protection standard applies whenever a worker is exposed to a fall from an elevation of four (4) feet or more above ground level. The standard may be found at 29 CFR Parts 1910, Subparts D and I, and 1926.50D.
- Where contractors or others are servicing or climbing towers, it is recommended that the towers be equipped with appropriate anchorage points and that the contractors be required to provide their own equipment, such as harnesses, lanyards, lines, etc.
- It is the tower operator's responsibility to verify that the contractor has the correct equipment to use on the tower; the employees and subcontractors have been properly trained; and the contract documents set forth

the responsibilities of the parties with respect to safety standards.

- Each location which has structures that require a fall protection system should have a written plan in effect that is reviewed before each climb and/or servicing of the tower.

The plan should define:

- Type of work activity to be performed, i.e., inspection, installation, etc.
- Location of the anchorage points on the structure.
- How to achieve a 100% tie-off of your fall protection system.
- A CBS employee designated as the tower site representative responsible for controlling access to the tower.
- Employee or contractor-employee competency training.
- Planned rescue system.

Additional information is available in the CBS guideline, *Tower Safety*.

Personal Protective Equipment (PPE)/RF protective clothing can be effective in reducing whole body RF absorption and should be considered when other safety measures are not practical or do not completely minimize exposure. Considerations for using an RF protective suit includes compatibility between frequency range and any specific exposure situation; wear and tear on the suit; and how to wear the clothing properly.

- Under 29 CFR 1910.134, it is the responsibility of the site management or employer to determine the type of PPE to be used. This information must be included in the site's RF Safety Plan.
- Personal monitoring devices, using time averaging based on 6 minute intervals for occupational/controlled areas and prominent site specific avoidance procedures for workers, provide additional measures in reducing potential exposures to RF.

RF Mitigation Measures

The permanent solution is to make changes of a technical, engineering, or physical nature to minimize the possibility of workers and the general public being exposed to RF fields in excess of the applicable MPE limits. All Examples of RF mitigation measures include:

- Elevate antennas: Elevating rooftop antennas (i.e. seven feet) can substantially reduce the power densities that are present at accessible areas on a rooftop. Raising an antenna may require a modification of the station license.
- Reduce power of antennas: Powering down may enable some facilities to qualify for a categorical exclusion designation which relieve the licensees from the FCC requirement to perform routine environmental evaluations. However,

categorical exclusion does not relieve a licensee's obligation to comply with exposure limits.

- Reposition/relocate antennas: Consideration should be given to traffic passageways that personnel would use while on the site to keep them a minimum of three feet from any non-elevated antenna. Directional antennas or arrays should be placed along the outside peripheries of the building or façade and mounted so the main beam is not directed on any accessible areas.
- Increased spacing between antennas can reduce RF power densities. Enclose sufficient fencing around antennas and arrays to prevent unauthorized or general public personnel from inadvertently positioning themselves in a high RF field.

TRAINING

Those allowed to enter high RF field areas are required to have training in safe and proper work procedures at such sites and to follow those procedures. Personnel who have received RF safety training will be aware of the dangers and mitigation procedures and will understand the importance of limiting their exposure and not putting themselves in harm's way.

All personnel who must enter into any area where power densities could exceed the accessible/uncontrolled or general public exposure limits should be appropriately trained or instructed. Training could range from basic or minimal awareness training to more extensive instruction for workers who may be subject to higher RF fields as a result of servicing or maintaining telecommunications equipment.

DOCUMENTATION

The FCC regulations also consider that personnel who are only present as a result of brief passage, such as a building maintenance worker walking through areas and not necessarily spending time in a controlled area, should be made fully aware of the potential for exposure so they can exercise control over their exposure by leaving the area or some other appropriate means.

RF awareness training should include employees who must work at transmitter sites; employees of other licensees; contractor employees performing telecommunication related services; and any other personnel that must enter the controlled areas. If this RF awareness training is not provided, these employees must be escorted by a trained authorized site employee.

- Safeguards while on the roof and at the transmitter site include:
- Personnel should assume all antennas are active and energized.
- Personnel should maintain a minimum distance of three (3) feet from any antenna and more around high RF fields.
- Personnel should obey all posted signs and warnings.
- Personnel should not stop near omnidirectional antennas or within the transmit zone of directional antennas, and should keep below elevated antennas.

Skilled technician training goes beyond the RF awareness training. The amount and intensity of safety training for personnel should be commensurate with their potential to be exposed to RF as a course of performing their job. At a minimum, training should be sufficient to enable workers to recognize all situations where they could potentially be exposed to excessive RF fields and to be able to take the necessary action and use the appropriate tools to protect themselves.

While it is important to recognize that most facilities are safely within the MPE limits, it's still important to be able to provide compliance and training documentation.

To coordinate all of the RF Safety Program requirements, each CBS location should identify a lead person to work with various internal groups to satisfy licensing requirements, employee and general public safety around antenna or other RF sources, security, and outside government agencies.

All sites should have a designated site RF Safety Officer responsible for RF exposure compliance. The name and telephone number of the site contact person shall be posted at the site, along with emergency information. The RF Safety Officer is responsible for determining if the site is in compliance with the FCC RF exposure regulations either through a determination of categorical exclusion or through routine evaluation and implementation of mitigation measures. The site RF Safety Officer should be prepared to show and defend both the compliance determination and continued site compliance to authorized representatives of the FCC, OSHA, or the EPA. Management must be involved in setting the rules for implementing the compliance procedures and must support the RF Safety Officer with coordination compliance of various roof and tower activities especially with the multi-user occupants. Survey equipment is available to perform the routine evaluation to determine compliance with OSHA and FCC exposure limits.

Additional information on Radiofrequency is available on the OSHA webpage.

The FCC has a bulletin with questions and answers regarding RF hazards.

An additional publication from the FCC entitled *Fields* (additional information for radio and television broadcast stations), contains very useful information.

These RF Safety Guidelines have been developed to ensure a safe work environment

for our employees and the general public. Implementation assistance can be provided by Corporate EHS&S.