

**Whip** - Antenna that radiates energy equally in all directions. Maintain as much distance as possible from this antenna.

**Microwave** - Antenna that radiates energy in one direction. RF energy has a narrow beam. Walk under or behind this antenna.



### Guidelines for Working in Rooftop Radiofrequency Environments

Always follow these points when working around electromagnetic energy (EME).

1. All personnel entering the site should have radiofrequency radiation awareness training.
2. All personnel entering the site must be authorized.
3. Obey all posted signs
4. Assume all antennas are active.
5. Before working on antennas, notify owners and disable appropriate transmitters.
6. Maintain minimum 3 feet clearance from all antennas.
7. Do not stop in front of antennas.

### What Biological Effects Can Be Caused by RF Energy?

Biological effects can result from human exposure to RF energy. Biological effects that result from heating of tissue by RF energy are often referred to as "thermal" effects. It has been known for many years that exposure to very high levels of RF radiation can be harmful due to the ability of RF energy to heat biological tissue rapidly. This is the principle by which microwave ovens cook food.

Exposure to very high RF intensities can result in heating of biological tissue and an increase in body temperature. Tissue damage in humans could occur during exposure to high RF levels because of the body's inability to cope with or dissipate the excessive heat that could be generated. Two areas of the body, the eyes and the testes, are particularly vulnerable to RF heating because of the relative lack of available blood flow to dissipate the excessive heat load.

There is currently no clear connection between RF exposure and cancer development.

### Other Documents with Information on RF

Human Exposure to Radio Frequency Fields:  
Guidelines For Cellular and PCS Sites  
<https://www.fcc.gov/consumers/guides/human-exposure-radio-frequency-fields-guidelines-cellular-and-pcs-sites>

Summary of Biological Effects of RF Exposure  
Taken from the Federal Communications Commission (FCC) Radio Frequency Safety Frequently Asked Questions at  
<http://www.fcc.gov/oet/rfsafety/rf-faqs.html>

### Contact for Questions

**Georgia Tech**  
**Office of Radiological Safety**  
**Office:** 404-894-3605  
**E-mail:** [ors@gatech.edu](mailto:ors@gatech.edu)

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## An RF Awareness Guide for Personnel Working Near Radiofrequency Transmitting Antennas at Rooftop Locations:



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## Introduction

This RF Awareness Guide is intended for those Georgia Tech (GT) employees that access rooftop locations containing radiofrequency (RF) emitting antennae.

## FCC Exposure Limits

The Federal Communications Commission (FCC) has established safety guidelines relating to RF transmitter sites. The FCC developed limits for human exposure, known as Maximum Permissible Exposure (MPE) limits, in consultation with numerous other federal agencies. The standards were developed by expert scientists and engineers after extensive reviews of scientific literature related to RF biological effects. The FCC explains that its standards incorporate prudent margins of safety.

The human exposure limits are provided for two groups of potentially exposed people.

| Occupational   | General Population   |
|--|--|
| People are “exposed as a consequence of their <i>employment</i> ” and are “ <i>fully aware</i> of the potential for exposure and can <i>exercise control</i> over their exposure”. | Any people that “ <i>may not be made fully aware</i> of the potential for exposure or <i>cannot exercise control</i> over their exposure”. |
|  | This group does not receive RF Safety & Awareness Training.  |

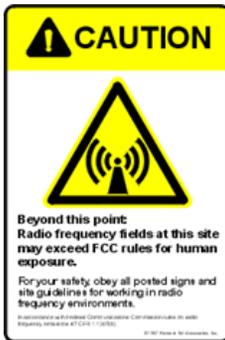
## Exposure Controls

Portions of any transmitter site may have high power densities that could cause exposures in excess of the FCC Occupational or General Population guidelines.

The companies that operate the antennae are required by law to implement the following:

- Restrict access
- Post notification signs on every access point to increase awareness of the potential for exposure BEFORE one enters an area with antennae.
- Place additional notification signs and visual indicators in an area with antennae (beyond an access point) where RF exposure levels may start to exceed the FCC’s limits.

## Typical Notification Signage



**(Notice) RF Guidelines** - Informs people of the basic safety guidelines for working in an RF Environment.

**Information**— Provides relevant contact information for any questions or requests.

**(Blue) Notice** – Indicates that, beyond the sign, RF exposure levels may exceed the General Population MPE limit but will remain below the Occupational MPE limit.

**(Yellow) Caution** – Indicates that, beyond the sign, RF exposure levels may exceed the General Population **and** Occupational MPE limit.

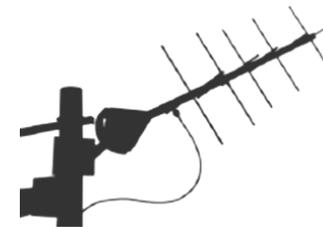


**(Red) Warning** – Indicates that, beyond the sign, RF exposure levels may substantially exceed the General Population **and** Occupational MPE limit.

## Indicative Barriers

In addition to physical barriers such as locked doors or ladders, antenna operators may also be required to place indicative barriers as a means of visually marking an area where RF levels are expected to exceed the FCC’s limits. Examples of Indicative Barrier materials are: plastic chains, buckets, reflective paint or tape, plastic cones, fiber-glass fences, and poles mounted in cinderblocks.

## Common Antenna Types



**Yagi** - Antenna that radiates energy in one direction. RF energy has a narrow beam. Walk behind or under this antenna.

**Panel** - Antenna that radiates energy in one direction. RF energy beam can range from narrow to very wide. Walk behind this antenna. Stay out of the general direction that the antenna is pointing.

