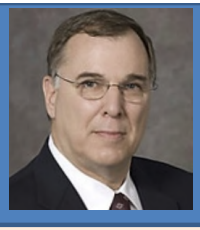

*Jerrold Bushberg PhD, DABMP, DABSNM, FAAPM, FHPS**
Health & Medical Physics Consulting
jbushberg@hampc.com---Sacramento, CA---1-800-760-8414

- ***35+ Years Experience Advising on RF Health & Safety Issues***
- ***Professional credentials:***
  - **Doctorate in Bionucleonics Purdue University- Primary Discipline: Biological Effects of Non-ionizing Radiation (NIR). Honored as Purdue Distinguished Alumnus 2016.**
  - **Faculty Yale University & UC Davis School of Medicine, Radiology & Radiation Oncology**
  - **Currently: Senior Scientific Vice-President & Chairman of the Board for the Congressionally Chartered National Council on Radiation Protection & Measurements (NCRP)- Non-Profit Scientific Advisory Committee in Service to the Nation on the Health & Safety of Ionizing Radiation (e.g., x-rays) and Non-ionizing Radiation (e.g., Radio waves used for wireless telecommunications); Chair of the NCRP's Non-ionizing expert advisory committee**
  - **-- Sinclair Medal for Excellence in Radiation Protection Science (2014)**
  - **National Board Certifications in Health & Medical Physics**
  - **Vice-Chair: International Committee on Electromagnetic Safety & Committee on Man & Radiation (COMAR) International Committee on Engineering & Biology**
- ***Retained as RF Health & Safety Consultant to*:**
  - **Numerous Public Entities including: U.S. Congress, State of California, City & County of San Francisco, Los Angeles County, Marin County, many school districts, local municipalities (e.g. cities, water districts), local residents and building owners.**
  - **Telecommunications Companies & Utilities**

***Diplomate, American Board of Medical Physics (DABMP); Diplomate, American Board of Science in Nuclear Medicine (DABSNM)**
Fellow, American Association of Physicists in Medicine (FAAPM); Fellow, Health Physics Society (FHPS)

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➢*Disclaimer*

— I have been retained by the City of Sacramento to review and evaluate the results of the FCC safety compliance testing as performed and documented by independent consultants who made measurements and calculated existing RF exposures from a selection of 5G & 4G small cell wireless RF telecommunication sites currently installed in the city. The reports were obtained directly from the city's IT department.

—The opinions expressed are based on my review of the material presented to me by the city and my professional judgment and experience of scientific and regulatory issues related to the use, health and safety of non-ionizing electromagnetic radiation.

—While based upon my professional judgement, the opinions expressed herein are not intended to necessarily represent the views of any other organization or institution, including but not limited, to the UC Davis School of Medicine, Departments of Radiology & Radiation Oncology and the Congressionally Chartered National Council on Radiation Protection & Measurements.

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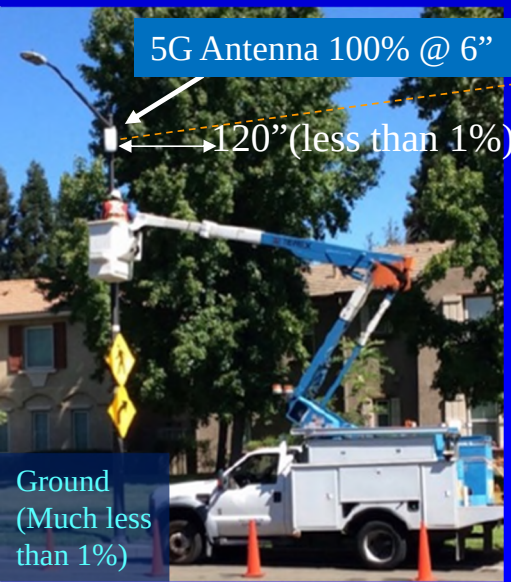
Results From RF Measurements of 4 & 5 G Sites in Sacramento

Type of Facility	Maximum Ground Level RF Exposure (Measured by H&E) Percent of FCC Public Maximum Permissible Exposure (MPE)	Maximum RF Exposure at Light Fixture (Measured by H&E) Percent of FCC Public Maximum Permissible Exposure (MPE)	At the Elevation of the Antenna ,the (H&E) Measured Horizontal Distance from the front of Antenna to the Distance to FCC Public Maximum Permissible Exposure (MPE) (inches)
4G Sites	0.6%	23%	48 inches
5G Sites	Less than 2.5%	Less than 2.5%	6 inches

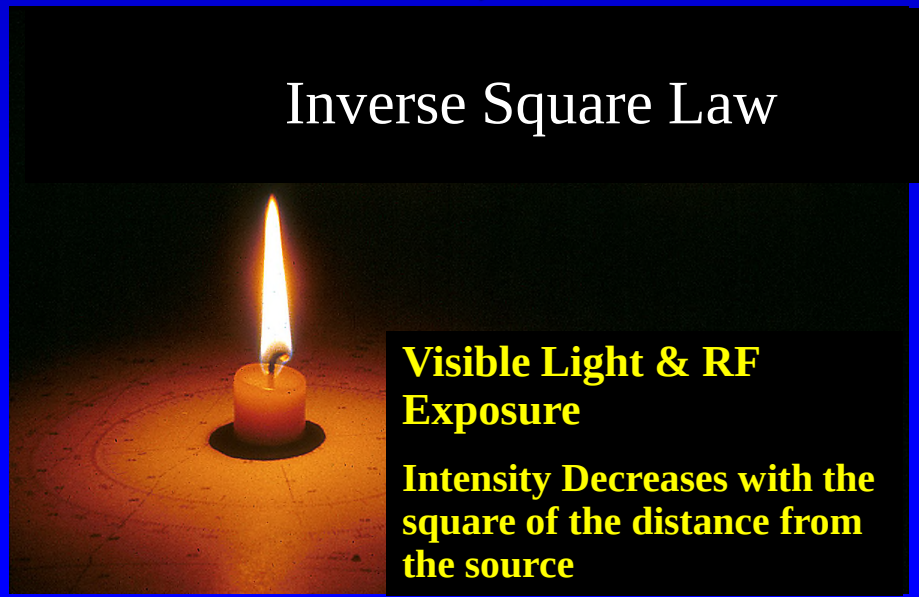
Why Is RF Exposure of the Public From Typical 5G & 4G Small Cell Sites So Low?

(Power-Distance-Direction)

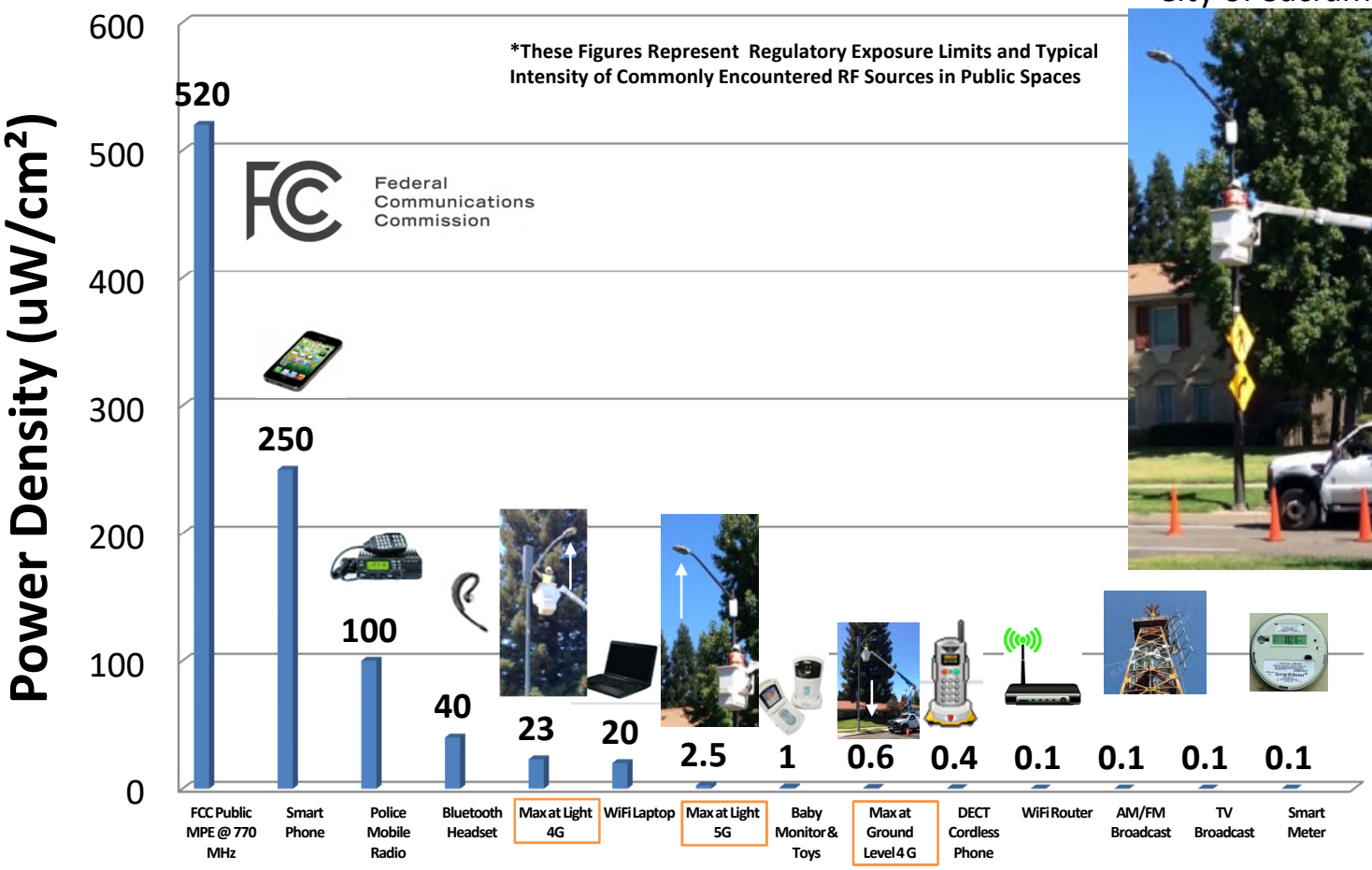
- **Low Power to the Antenna (~ 2Watts @ 5G & 160Watts @ 4G)**
- **People are Not next to the Antenna (Inverse Square Law) Example: Moving from 10 x's further away (1' to 10' directly in front of the antenna reduces exposure by 100 x's**
- **The Antenna are Directional (Energy Directed at Horizon Not Down or Back)**
- **RF Measurements Indicate that Existing RF Exposures from other sources are Low)**



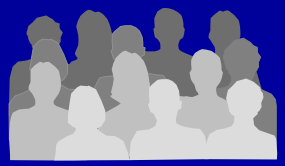
5G Example: 100% Public Limit **@ 6"** thus **@ 120"** (10 ft) 20x's further away exposures at level of antenna would be $(20)^2 = 400$ **x's** lower. Less than **1%** of limit for continuous Public Exposure)



Typical Public Radiofrequency Exposure



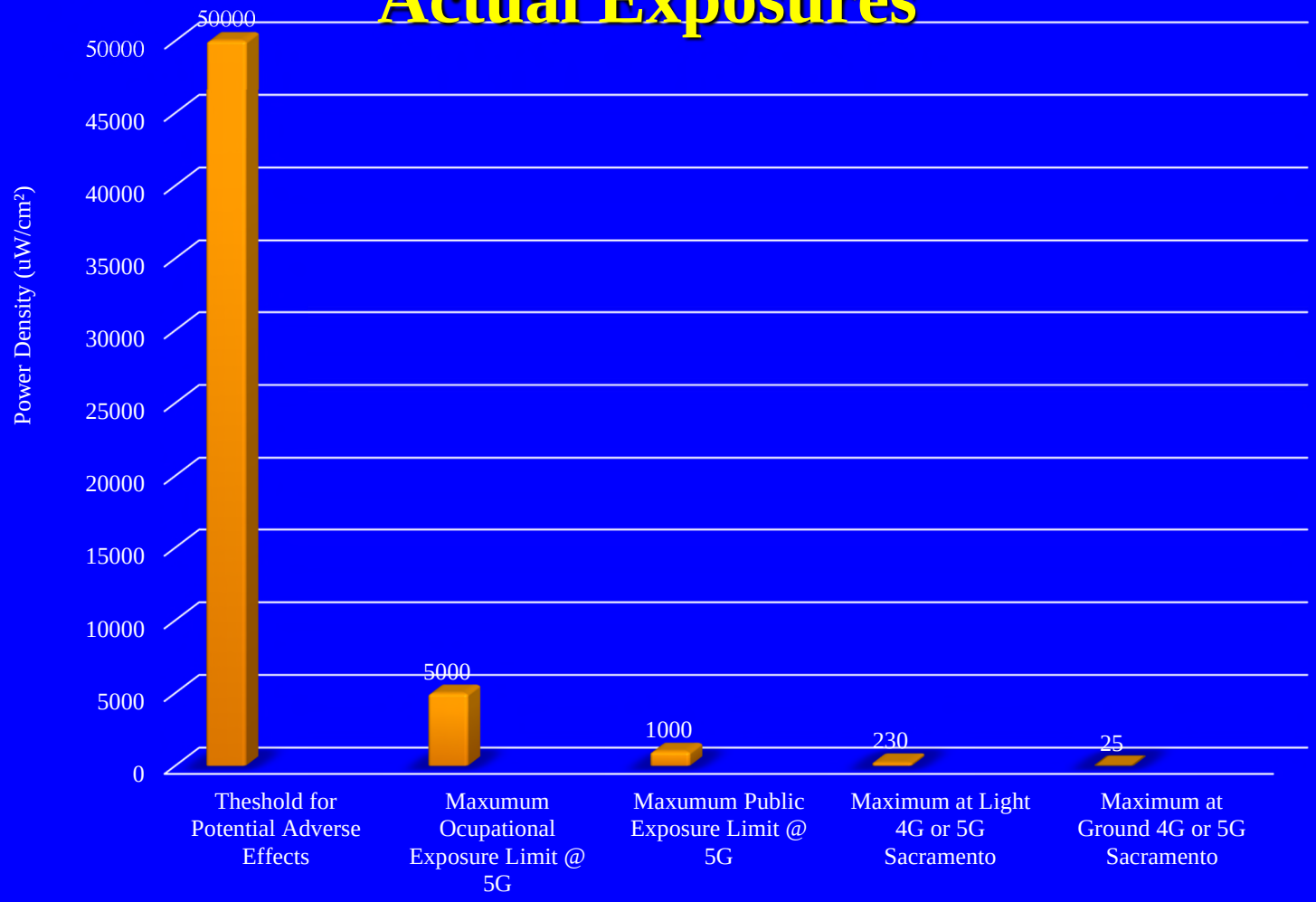
City of Sacramento 5G Site

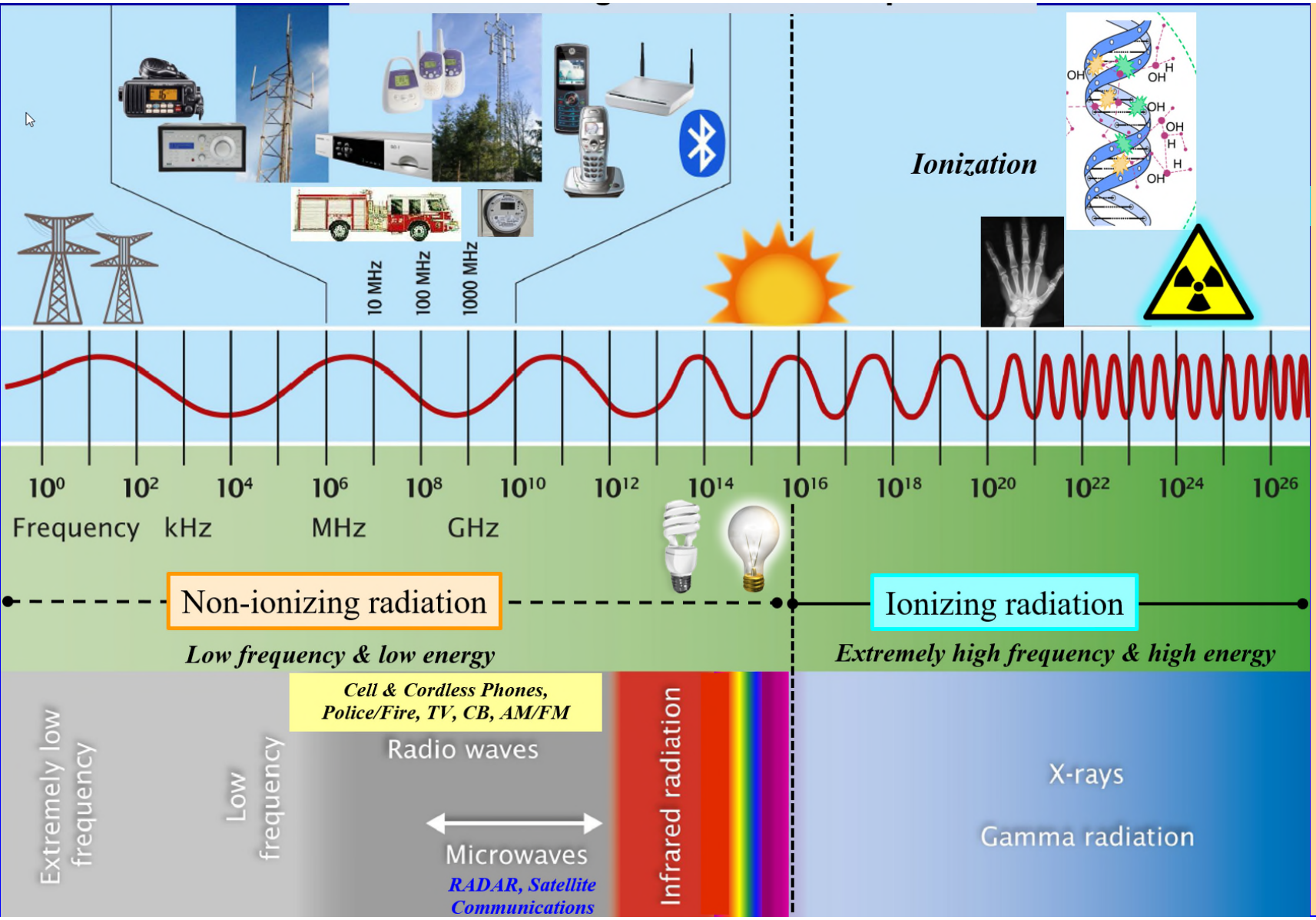


Public Exposure Limit

- Current FCC (USA) RF Exposure (August 1997) Regulations based on IEEE & NCRP
- Assumes continuous exposure 24/7/365
- Established to be protective of the general population including children and the infirmed
- Exposure Limit Incorporates a Safety Factor 50 x's below the RF exposure level that is believed to be potentially hazardous
- Federal Interagency Agency Working Group (RF Safety Surveillance EPA-FDA-NIOSH-OSHA-FCC)

Threshold for Adverse Effects vs. Safety Standard vs Actual Exposures





The Electromagnetic Spectrum

Is simply a form of **energy** consisting of and **electric** & **magnetic** fields traveling through space.

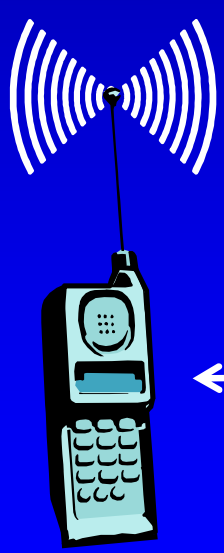
Can be described in terms of **frequency** (Hz), **wavelength** (nm) or **energy** (eV)

An Effective Way To Reduce Public RF Exposure

Adaptive Power Control &Cell Phone RF Output

Cell Phone RF Output
Maximum

Cell Phone RF Output
Minimum
(1,000 x's) Lower



Distance From
Cell Site (Antenna)

Far

Near

Cell Site

Weak

Signal Strength

Strong