

MICROWAVES IN THE MEDIA: TRUTH OR CONSEQUENCES

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Over the last decade there has developed a public concern and in many cases public fear over potential biological hazards of exposure to non-ionizing radiation - with a unique fearful connotation to "microwaves." How did this happen and what can be done about it. We believe the basic problem is that of a propaganda war - not scientific or technical. The tools required to restore rational perspective are rhetorical and require expression in the media if the public is to be reached.

Microwaves in the Media

Years ago very few people knew of the word "microwave." The development of the consumer microwave oven in the late sixties began to expose the public to the word. The Congressional hearings and the publicity following a television "radiation" scare swept in "microwaves" along with all radiation to be controlled in an umbrella fashion by the Radiation Control for Health and Safety Act of 1968 (P. L. 90-602). At about this time a series of Jack Anderson columns began to focus on the dangers of microwaves with allegations of injuries among veterans due to exposure to radar. This was soon extended to microwave ovens. In Fig. 1 we show a sampling of the variety of headlines for one Jack Anderson column¹ in 1971 which attacked microwave ovens. It demonstrates the power of headlines which is an editorial prerogative. Would you more likely read the article with the headlines "leaky ovens cook eyeballs" or "microwave risk played down."



Fig. 1. A Variety of Headlines for an Article on Microwave Oven Leakage

In 1973 in testimony² before the U.S. Senate, Dr. Milton M. Zaret stated, "There is a clear present and ever increasing danger to the entire population of our country from exposure to the entire non-ionizing portion of the electromagnetic spectrum." True to his belief Dr. Zaret over the years has alleged hazards from weak 60 Hz fields to infrared and has not missed many of the spectral regions in between.

Coincident with Dr. Zaret's testimony Consumers Union publicly³ attacked the adequacy of U.S.

emission standards on microwave oven leakage. This played a role in assuring a key place for "microwaves" in the spectrum of fears.

Over the years the newspapers occasionally ran a feature article on "microwave" hazards with limited impact. Several news events, however, helped stimulate broader and more intense media coverage. These included the public discussions of Project Seafarer, proposed high-voltage lines and the serial installments on the Soviet "microwave" irradiation of the U.S. Embassy in Moscow. This helped stimulate the writer Paul Brodeur to tackle the subject after having covered environmental and public health issues like the celebrated asbestos hazard. By the time his book,⁴ "The Zapping of America," appeared Brodeur had joined Dr. Zaret in the sweeping indictment of electricity.

With Brodeur's stimulation the media (print and electronic) coverage of "microwaves" has increased. In Fig. 2 we see a sampling of recent typical headlines which often plant strong association by the words "Zapping," "killing," "lethal," etc. Although power lines are not exempt, the most intense fear is still reserved for "microwaves."

The trouble with microwaves: Interference

MICROWAVES

No one knows what dangers they pose



Fig. 2. A Recent Sample of Unfavorable Headlines

A sampling of favorable headlines is shown in Fig. 3 from a more limited supply than that for Fig. 2. Unfortunately, while those in Fig. 2 usually represent national or syndicated circulation, most of the favorable stories in Fig. 3 represent limited circulation - in local papers, trade journals or even an advertisement by industry. Note well, however, the prominence of COMAR, including its chairman, Dr. Justesen, in the rebuttal efforts which these headlines represent.

What is this all about? In short, the microwave industry faces a propaganda war, not of its own making, and also one that is unrecognized by many in industry. As I point out in my editorial,⁵ "The Conning of America," there has been a somewhat undirected media campaign to heighten fears of "microwave" radiation and to question safety of a growing list of devices and systems - from anti-theft systems, burglar alarms, all types of radio,



Fig. 3. A Recent Sample of Favorable Headlines

and even the video-data terminal (VDT) - allegedly a source of some type of microwave-like radiation.

Spectral McCarthyism and Its Obverse

It must be admitted that the leading alarmists have not discriminated along spectral lines in assigning alleged hazards and fears. Still there persists a widespread ingrained belief that "microwaves" are uniquely hazardous. Indeed, for the early years of the past decade while "microwaves" were attacked in the press and in government hearings - meaning microwave ovens and radar - many producers and users of the "non-microwave" part of the spectrum listened with various shades of apprehension and appreciated the advantages of not being "microwave." Occasionally various inhabitants of the hf and VHF spectral regions react with injured pride when the attack spreads to them - their reactions implying a recognition of a type of "spectral McCarthyism" - because "microwaves" are bad does not make other spectral regions bad by association. Recently a radio engineer took umbrage and wrote "...for your article to infer that TV and FM broadcast radiation is in the same category as microwaves is very irresponsible."

What is "Microwaves"

Let us first look at the answer given by the U.S. General Accounting Office in a recent report⁶ which criticizes the FDA and demands more protection against "microwaves".

"Microwave radiation is generally defined as the band of frequencies from about 300 megahertz (MHz) to about 300,000 MHz..."

This definition corresponds roughly to that given by Czerski⁷ who also states that the implicit definition of "microwaves" by the American National Standards Institute (ANSI) is 10 MHz - 100 GHz. Czerski does state, however, for the range of 30-300 MHz that "many statements and findings concerning the biological effects of microwaves may be applied also to waves of this region, which is typical for television."

A more logical basis of definition for "microwaves" follows from the assumption that dimensions

of the apparatus or objects of interest are of the order of the wavelength so that analysis in terms of modes is appropriate. One can make a logical breakdown of the NIR spectrum as shown in Table I.

Note that these are broad concepts that relate to the principal dimensions L of the object or system of interest. We also recognize that possible alternatives to quasistatic and quasi-optical are "RF" and "nanowave."⁸ On this basis one can justify the ANSI C95 frequency range (10 MHz - 100 GHz).

The concept of what is the "microwave" frequency for man is important in scaling the results of animal experiments to man.

Nature of Unfavorable Publicity

The alarmist approach in the press includes several elements:

a. A citation of a plethora of reported experiments with animals with varying health connotations and various degrees of validity;

b. A review of allegations of human injury with considerable overtones of sympathy for the "victim" and little or no attention to rebuttals;

c. A sweeping emotional resort to the philosophical position that one does not know if any level is safe until large scale, long-range chronic exposure studies are done.

All of these charges can be rebutted. Animal experiments all show threshold for effects and do not apply for typical exposures to low-level microwaves.

Despite the publicity about human injury, much of it now legendary, I know of no court case that was decided in favor of those alleging such injury. To the contrary, there are several court cases that were decided in favor of the defendants.

With respect to the philosophical approach, one can predict no effects at levels below thresholds determined in all extensive confirmed studies. Indeed, the existence of thresholds is assumed in all safety standards throughout the world.

Generation of Data by the Media

A prominent example is an extensive article in the Boston Globe⁹ in which a reporter measured ambient levels at about twelve sites in southeastern New England. He imputed these levels to nearby sources in view - relay towers, radars, and radio stations. Figure 4 shows the data of the reporter ranging from $30 \mu\text{W}/\text{cm}^2$ to $20,000 \mu\text{W}/\text{cm}^2$ with most readings at around $100 \mu\text{W}/\text{cm}^2$. This is in startling contrast to published EPA data¹⁰ for background levels in the Eastern United States - as depicted in Fig. 4.

In fact, the newspaper reported false data and these data since have been quoted in various localities in opposition to microwave facilities and to impugn the credibility of authorities who report much lower levels.

Examples of Overkill

It has been clear for several years that the media campaign can affect the most innocuous sources of microwaves - microwave relay towers, anti-theft devices, and microwave ovens. These are attacked

TABLE I. Breakdown of NIR Spectrum

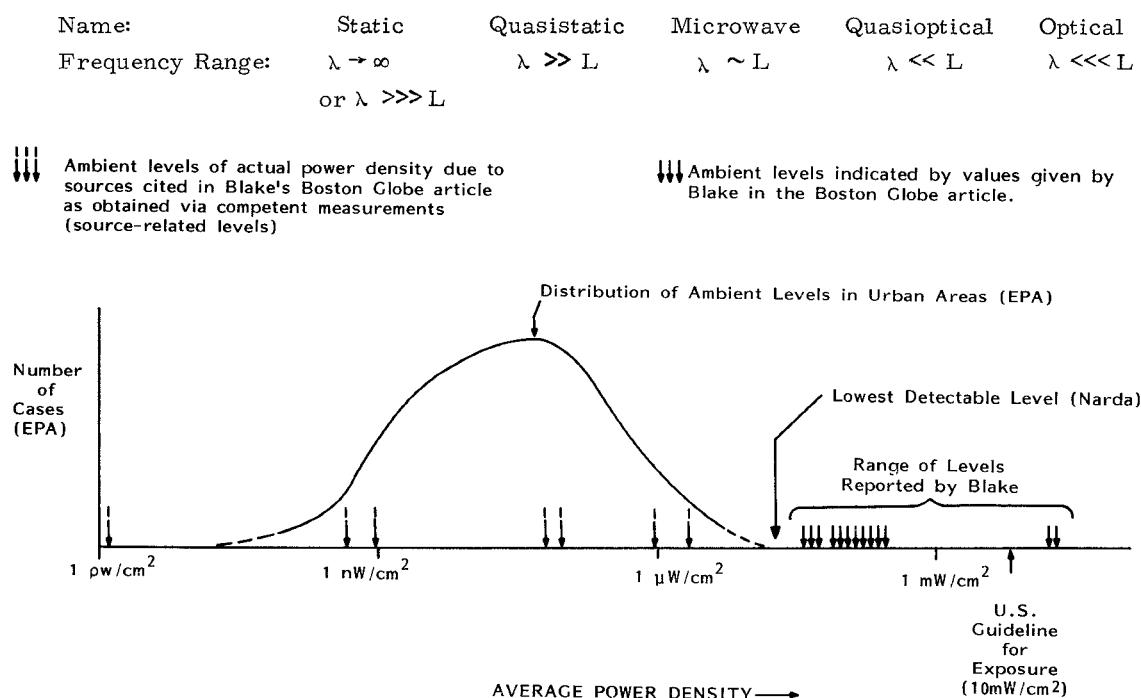


Fig. 4. Comparison of Boston Globe Data on Ambient Microwaves with EPA Data and Actual Levels

as potentially hazardous even though exposure levels are orders of magnitude below those in the most stringent safety standards in the world. Review of these cases shows a tragic waste of time and energy of all involved.

Public Education

What we are involved with is a propaganda war. For too long competent knowledgeable people have washed their hands of this kind of thing. Instead the alarmists occupy most headlines, appear on TV, publish articles and books, write letters to newspapers, and stimulate and organize grass-roots opposition to "microwaves." The output of their activities is what most people (including M.D.'s and lawyers) get for their basic education on "microwaves."

The propaganda war is real. We can honestly say that it has created a false view of "microwaves" in the public mind which is bound to affect the acceptability of all "microwave" products and "microwave" facilities. It is the duty of microwave engineers as honest professionals to become informed and inject themselves into public discussions in the media. Only in this way can we hope that the truth about "microwaves" will find its way into the media. The consequences of not doing this are already clear and tragic.

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