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Electronic smog and microwaves

From the Desk of
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Our urban environments are saturated with man-made microwave radiation (no one knows exactly how much); it has been dubbed "electronic smog" and is being added by some to the growing list of environmental pollutants.

Unlike the shorter waves of the spectrum (x-rays, gamma rays) which are known to be harmful to living tissue, microwaves have been assumed to be harmless at low levels of exposure. On this assumption has been built a multibillion dollar technology that has brought microwaves off the military base and into commercial use and most recently, via the microwave oven, into the home. Microwave technology is used in industrial drying and bonding processes, tv and radio communication, telephone relay systems, deep-heat therapy in medicine and ship and aircraft navigation

During the last twenty years, Eastern European scientists have through steady research efforts built a body of microwave literature that has resulted in a heightened concern in that part of the world about a possible health hazard related to long-term, low-level exposure to microwaves. Soviet safety standards for microwave workers are up to one thousand times stricter than the generally accepted, voluntary US standard of 10 milliwatts per square centimeter. (Microwave ovens, the exception, have since 1971 been subjected to legally enforcible standards of a stricter nature.) "Microwave sickness" is a recognized occupational disease in the USSR, with Soviet scientists attributing to it symptoms ranging from irritability to cardiovascular effects.

In the US, concern about possible harmful effects of microwaves originated in the Department of Defense, the first major user of the technology. Defense set up a Tri-Service group to study the matter in 1956; four years of research resulted in a recommended standard of 10 milliwatts per cm^2; that is, it was concluded by Defense that any

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individual could be exposed at that rate over the entire surface of the body for an indefinite period without danger to health.

The "10" standard gained wide acceptance in this country and has been reaffirmed as recently as 1973 by the American National Standards Institute (ANSI). Yet it has been pointed out that the Tri-Service group fixed that standard on the basis of experiments, 95 percent of which involve exposure to emissions of over 100 milliwatts per cm² (300-400 milliwatts, on the average). And the ANSI group, according to one member, did the same—extrapolating from experiments above 100 milliwatts.

100 milliwatts per cm² is generally considered to be the "thermal threshold" because it is approximately at that point that living tissue "heats up." Prolonged exposure at 100 milliwatts can kill an animal and, presumably, humans as well. The assumption of those who set the US standard seems to have been that emissions below 100 milliwatts are not harmful, but that for safety, a factor of 10 was taken.

It is below 10 milliwatts per cm² that the domestic and international controversy finds its focus. The Eastern European literature contains observations of microwave workers for periods up to 10 years and ascribes harmful effects at emission levels as low as a fraction of a milliwatt per cm². US scientists have been generally skeptical of these findings, in part because of the difficulty of interpreting the data which are

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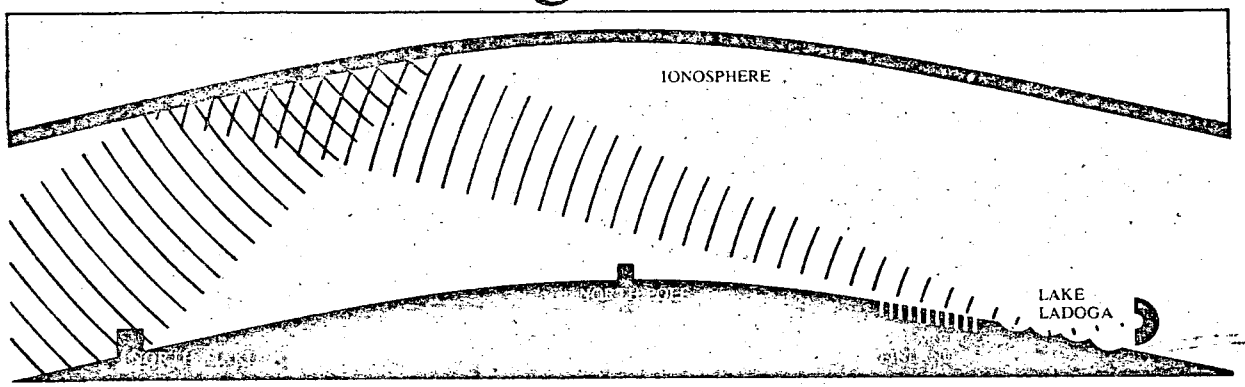


Diagram 1

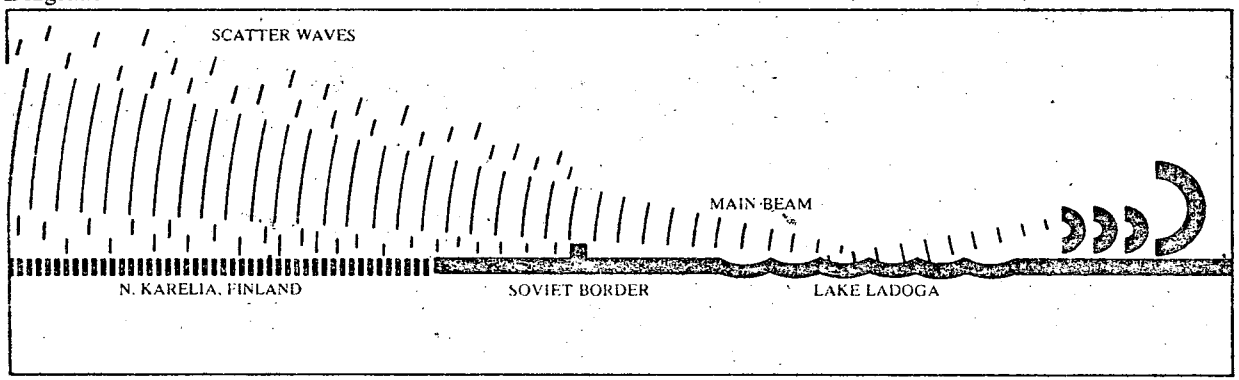


Diagram 2

are undertaking a statistical study of population groups with an established history of long-term exposure, such as microwave workers whose medical histories are on file. Results, though, will not be available for years.

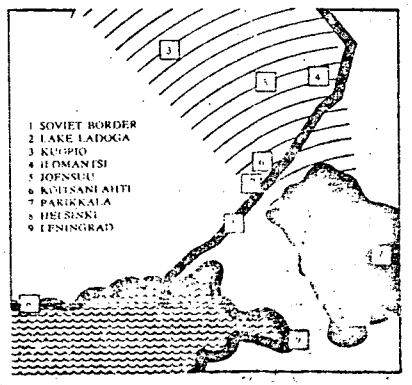
Access to twenty years of research by Eastern European scientists was opened to US specialists when the World Health Organization got into the field and sponsored a major international symposium on the subject in Warsaw in 1973. For the first time, US and Soviet experts talked in person about microwaves. WHO has since designated two centers (one is the BRH) to encourage standardization of procedures and

of experts is convinced a health hazard exists at exposure levels of 10 or under, a small number is convinced there is no hazard and the great majority fall somewhere in between.

One of those convinced that microwaves are hazardous to your health is Dr. Milton Zaret, an ophthalmologist and research scientist who has specialized in the effects of nonionizing radiation, including lasers and microwaves for 20 years. Zaret claims that exposure to microwaves even at low levels, can cause capsular cataracts in man. His findings have been disputed by several Americans but were independently confirmed by two French ophthalmologists from studies of French radar techni-

Dr. Zaret further claims that low-level microwave exposure could be linked to heart disease, loss of hearing, blindness and cancer. "If the doctors can't solve this problem, the lawyers will," Zaret has said.

Because of the confidential



nature of occupational disability settlements, not much is

which follows the curve of the earth (as opposed to the more conventional "line-of-sight" emission) by directing a beam off a smooth surface (usually a large body of water) which then bounces off the ionosphere and returns to earth (diagram 1). It is used by both the US and the Soviet Union as part of an early warning system in defense against nuclear missile attack.

Karelia is a poor, rural area of Finland, sparsely populated, in which most of the inhabitants are either farmers or lumberjacks. Unexplained incidence of heart attack among young and old alike reached epidemic proportions several years ago, causing the population to petition the government to do something about it. A statistical study was launched under the auspices of WHO in 1973, and a report on the project appears in the April issue of Prism, an American Medical Association publication.

Ordinarily, the incidence of heart attack parallels population density, being highest in metropolitan areas (New York and Helsinki have comparable rates). In North Karelia, the opposite is true. The small city of Kuopio (map) has a population one tenth that of Helsinki, yet has a greater incidence of heart attack. Joensuu is smaller than Kuopio, yet has an even higher incidence. And Ilomantsi, smallest of the three, has one of the highest known rates in the world.

WHO's North Karelia Project has not yet turned up an explanation, although the Prism article reports an exceptionally

harmful effects at emission levels as low as a fraction of a milliwatt per cm². US scientists have been generally skeptical of these findings, in part because of the difficulty of interpreting the data which are often not described in sufficient enough detail to permit replication of the experiments.

US research efforts in the area of long-term, low-level exposure have been at best sporadic over the last twenty years, so that there is little to go on in the domestic scientific literature. But there is presently renewed activity and interest: the White House Office of Telecommunications Policy, which monitors this research, counts 106 ongoing projects in 13 government agencies, nearly half of which are being carried out by the Department of Defense.

David Janes of the Environmental Protection Agency (EPA) admits that "the data base is inadequate" but cautions that "nothing indicates that there is a frank hazard."

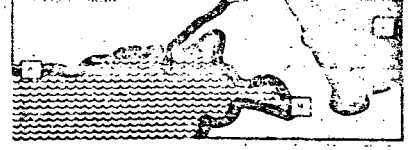
Because it is not possible to do controlled studies by subjecting humans to low-level exposures to microwaves over a period of 20 or 30 years to determine concretely if a health hazard does exist, the various government agencies are doing the next best thing. The Bureau of Radiological Health (BRH) of the Department of Health, Education and Welfare and the National Academy of Sciences subject in Warsaw in 1973. For the first time, US and Soviet experts talked in person about microwaves. WHO has since designated two centers (one is the BRH) to encourage standardization of procedures and facilitate exchange of information between East and West. Sharp disagreements on appropriate ways to measure exposure remain, but the dialogue is ongoing.

In the US, a small number of French ophthalmologists from studies of French radar technicians.

While the debate rages over whether or not there is such a thing as a "microwave cataract" and if so whether it can be caused by exposures of under 10 milliwatts per cm², even at low levels, can cause capsular cataracts in man. His findings have been disputed by several Americans but were independently confirmed by two

A MICROWAVE INDEX

Milliwatts per square centimeter	*Effect/Definition*
300-400	Emission levels used in experiments which led to the conclusion that 10 mW/cm² is a safe standard.
100	Living tissue "heats up"; fatal if prolonged.
10	Voluntary standard for US industry and military (except for microwave ovens).
5	Army/Air Force technical bulletin in 1965 cites occasional nausea and epigastric distress among men exposed to radar at this level of emission.
5	Maximum leakage allowed for the life of a microwave oven as measured within 5 centimeters of any surface.
1	Eastern European studies report adverse health effects at exposures of a few milliwatts to a fraction of 1 milliwatt per cm².
0.1	Maximum allowable emission for Soviet worker exposed an average of 2 hours a day.
0.05	Estimated exposure to a person standing 50 centimeters (arm's length) from a microwave oven which has maximum allowable leakage of 5 mW/cm² based on the fact that the radiation diminishes by the square of the distance.
0.00000001	Natural microwave background provided by the sun.



nature of occupational disability settlements, not much is known about court proceedings referred to by Dr. Zaret. But one which is attracting considerable attention is under way in California in the form of a suit by seven radar technicians against Lockheed Aircraft and several manufacturers of radar equipment. All seven serviced radar equipment aboard EC-121 aircraft over a period of many years. Six have contracted cataracts and one has died of cancer.

Dr. Zaret participated in the WHO conference in Warsaw, causing a stir when he departed from his pre-published presentation on the subject of microwave cataracts to discuss a rare health phenomenon in Finnish Karelia, positing a link between an unusually high incidence of heart attack there and a massive source of microwave emissions which he then thought might be a Soviet communications installation just over the Soviet-Finnish border opposite Karelia.

He has since modified his thesis by identifying the installation as a troposcopic scatter radar site on the edge of Lake Ladoga in Soviet Karelia, citing a high US intelligence authority as his source. This form of radar, known as "over-the-horizon" radar, sets up a field

tsi, smallest of the three, has one of the highest known rates in the world.

WHO's North Karelia Project has not yet turned up an explanation, although the Prism article reports an exceptionally high cholesterol content in the Karelian diet. Dr. Zaret claims that Lake Ladoga is a logical site for over-the-horizon radar as part of the Moscow defense system (it lies directly on the line between Moscow and the hardened ICBM missile installation in North Dakota, traced along the shortest or "circle" route over the pole). And he posits a link between the assumed massive radiations traveling over Lake Ladoga (diagram 2) and the Karelian health problem.

In addition to the statistics indicating the higher incidence of heart attack in the smaller villages closer to the Soviet border, Zaret cites unpublished information from sources close to the WHO study who say that unusually high incidence of cancer has turned up in two hamlets adjacent to the border — Koitsanlahti and Parikkala (map).

Zaret's hope is that WHO might expand the scope of the existing Karelia study to include an investigation of the microwave factor, as this could provide much-needed data to help determine whether the expanding use of microwave technology threatens global health and environment.