2020 Short Takes

Dutch Advisory Panel Calls for Caution on 5G

Don't Use Millimeter Band Pending More Research

November 11, 2020

An advisory panel to the Health Council of the Netherlands is recommending a "cautious approach" to 5G radiation exposures.

The committee is also advising that the 26 GHz frequency band (millimeter waves) not be used "for as long as the potential health risks have not been investigated."

The new advisory report, *5G and Health,* was originally released in September with an executive summary in English. Now a full 131-page translation is available (it features 807 references). There is also a 33-page overview.

The nine-member panel, all from Holland, was chaired by Professor Hans Kromhout, an epidemiologist at the University of Utrecht's Institute for Risk Assessment Sciences. One of the two scientific secretaries is the Health Council's Eric van Rongen, the current vice chair of ICNIRP and its chairman from 2016 until earlier this year.

While the committee endorses the recently revised ICNIRP guidelines, it notes that, "[I]t cannot be excluded that exposure under the latest ICNIRP standards also has the potential to affect health."

Here is the full text of the committee's four recommendations to the Dutch Parliament:

> 1. Because the lower frequency bands for 5G (up to 3.5 GHz) have already been used for telecommunications applications and Wi-Fi for years without resulting in any proven adverse health effects, the committee sees no reason to stop or restrict the use of these frequency

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bands. It does however recommend that the exposure should be monitored before, during and after the rollout of the 5G systems. This will make clear to what extent exposure to radiofrequency electromagnetic fields changes as a result of the introduction of 5G and any long-term health risks can then be estimated better. The WHO analysis can also be used in estimating the risks.

2. The committee recommends doing more research:

• epidemiological research into the relation between exposure to the 5G frequencies used and the incidence of cancer, reduced male fertility, poor pregnancy outcomes and birth defects. An ongoing international study into the use of mobile telephones, in which the Netherlands is participating, can play a role in this.

• experimental research into the health effects of exposure to electromagnetic fields in the 26 GHz frequency band.

• scenario studies to get a picture of the exposure of individuals as a result of wireless communication systems (3G, 4G and 5G).

3. The committee recommends not to use the 26 GHz frequency band for 5G for as long as the potential health risks have not been investigated.

4. Finally, the committee recommends using the latest guidelines from the International Commission on Non-Ionising Radiation Protection (ICNIRP) as the basis for exposure policy in the Netherlands. Because it cannot be excluded that exposure under the latest ICNIRP standards also has the potential to affect health, the committee recommends to take a cautious approach and keep exposures as low as reasonably achievable.

In Memoriam: Moris Shore

Senior FDA Radiation Official Challenged Adequacy of RF/MW Exposure Limits in the 1970s

October 10, 2020

“A safe level of microwave exposure was arbitrarily established — no dissent from the arbitrary safe standard was tolerated— in a largely thermal (i.e., high-exposure level) microwave research program … [It] and the averaging provisions … may represent a directed verdict rather than a culmination of objective and unbiased scientific judgment.”

Does that sound familiar?

Actually, it’s from a paper delivered more than 40 years ago by Moris Shore, the former director of the Division of Biological Effects at FDA’s Bureau of Radiological Health. Yesterday the *Washington Post* revealed that Shore died of kidney disease on July 1 at the age of 92.

In the quote above, Shore was referring to the U.S. 10 mW/cm² ANSI standard adopted in 1974, which, in turn, was an update of the 1957 and 1966 limits. He charged that it "ignored a substantial body of published scientific findings that documented low-level biological effects."

The current IEEE standard evolved from these same 1957/1966/1974 standards. It is a direct descendant.

Shore also pointed out that the 1974 standard was much weaker than those adopted by two large corporate contractors. For example, GE's limits were 10 times more stringent and those of Bell Telephone Labs were *100 times* stronger. Both companies had set their internal standards in the 1950s, but later accepted the looser limits under pressure from the military, even though there was little new research.

Shore made these remarks in a paper presented at the *10th Annual National Conference on Radiation Control*, held in Harrisburg, PA, in the spring of 1978.

Here is the full text of the announcement in the *Post*:

Moris Shore, FDA scientist

> Moris Shore, 92, a retired Food and Drug Administration public health scientist who studied biological effects and health implications of radiofrequency and microwave radiation exposure, died July 1 at a hospital in Bethesda, Md. The cause was kidney disease, said his son, Michael Shore.
>
> Dr. Shore helped establish industry performance standards on electromagnetic radiation emissions from electronic products and conducted research on the association between prenatal diagnostic X-ray exposure and childhood leukemia. He worked for several federal agencies during his career, including the FDA from 1971 to 1985, when he was deputy director of the Office of Science and Technology in the Center for Devices and Radiological Health.
>
> He also helped organize a visiting scientist program at the FDA and, in retirement, served as a consultant to the Pan American Health Organization and the law firm Fried, Frank, Harris, Shriver and Jacobson in Washington.

5G Waveforms in Dispute

Ken Foster & Niels Kuster Disagree on Averaging Times

September 25, 2020

Very little has been written in the popular media about the waveforms used in 5G signals. Two outstanding questions are: How fast are the pulses? How powerful are they?

In 2018, Esra Neufeld and Niels Kuster of the IT'IS Foundation in Zurich issued a warning in a paper in *Health Physics,* urging that existing exposure standards be revised with shorter averaging times to address potential thermal damage from short and strong pulses:

> "Extreme broadband wireless devices operating above 10 GHz may transmit data in bursts of a few milliseconds to seconds. Even though the time- and area-averaged power density values remain within the acceptable safety limits for continuous exposure, these bursts may lead to short temperature spikes in the skin of exposed people. ... [Our] results also show that the peak-to-average ratio of 1,000 tolerated by the ICNIRP guidelines may lead to permanent tissue damage after even short exposures, highlighting the importance of revisiting existing exposure guidelines."

In a letter to the journal, Kenneth Foster* of the University of Pennsylvania countered that their claims do not hold up:

> "Because real-world communications technologies produce pulses of much lower fluence than the extreme pulses considered by Neufeld and Kuster, the resulting thermal transients from them will be very tiny in any event."

Neufeld and Kuster's response to Foster is here.

(Keep in mind that as the averaging time increases, radiation peaks smooth out and compliance with exposure limits becomes easier.)

FCC Proposes Shorter Averaging Times

In its proposed revision of its own RF rules, issued last December, the U.S. FCC appeared to side with Kuster, expressing concern over the many wireless devices that "transmit in short bursts." Here is part of what the FCC stated:

136. With respect to the appropriate time-averaging period, we note two references for specifying time-averaging limits: (1) the ICNIRP standard provides for averaging over 6 minutes at 10 GHz and reduces to 10 seconds at 300 GHz on a complex basis,[367] and (2) the IEEE standard has an averaging time of 25 minutes at 6 GHz dropping to 10 seconds at 300 GHz.[368] However, since we do not limit temporal-peak SAR or power density, all the energy available in a time-averaging period could be deposited in a moment resulting in a well-defined temperature rise and be compliant with the rules. Thus, using the extended time-averaging periods of 6 minutes or 30 minutes set forth in our rules in other contexts or either of the alternative time windows specified by ICNIRP and IEEE could allow for inappropriate temperature rises in extreme cases when intense exposure occurs only for a brief period. By reducing the time-averaging period, the maximum possible temperature rise can be limited to a reasonable quantity.

The FCC put forward shorter averaging times for signals at higher frequencies —dropping down to 1 second above 95 GHz. These are detailed in the table below. In contrast, the averaging times in the ICNIRP and IEEE standards are as high as 25 minutes.

Table 3 – Proposed Maximum Averaging Times for Device-Based Time-Averaging.

Frequency (GHz):	< 2.9	2.9-7.125	7.125-10.5	10.5-15.4	15.4-24	24-37	37-53	53-95	> 95
Time (seconds):	100	49	27	14	7	4	3	2	1

Now, the wireless industry is asking the FCC to favor Foster's views over Kuster's. Last week, a team from the Mobile & Wireless

Forum (MWF) —formerly known as the Mobile Manufacturers Forum (MMF)— held a virtual meeting with members of the FCC's Office of Engineering and Technology (OET) and lobbied for the withdrawal of the proposed new averaging times.

The PowerPoint slides of MWF's presentation are here and its cover letter to the FCC is here. (Chuck Eger, who signed the letter, was formerly in Motorola's Washington office. He mistakenly used old MMF letterhead.)

Members of the MWF include Apple, Huawei and Samsung. Foster's research has been supported by the MWF.

Will the FCC formalize the new averaging times in its final RF rules, or follow the MWF request and scrap them? Stay tuned.

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* For more on Ken Foster's work on this issue, see these two recent papers; both are open access:

• Kenneth R. Foster, Marvin C. Ziskin, Quirino Balzano and Akimasa Hirata, "Transient Thermal Responses of Skin to Pulsed Millimeter Waves," *IEEE Access,* 2020;
• Kenneth R. Foster, Marvin C. Ziskin, Quirino Balzano and Akimasa Hirata, "Thermal Analysis of Averaging Times in Radiofrequency Exposure Limits Above 1 GHz," *IEEE Access,* 2018.

Each paper acknowledges the support of the MWF.
Q. Balzano, a coauthor of the two papers, is a member of the board of the IT'IS Foundation. In their 2018 *Health Physics* paper, Neufeld and Kuster acknowledge Balzano for his "insights and guidance on emerging wireless communication systems."

This article is adapted from a thread of seven tweets posted by *Microwave News* yesterday. If you are not yet following *Microwave News* on Twitter, give us a try, @microwavenews.

Does Cockpit RF Disorient Pilots?

DARPA's New ICEMAN Project Seeks Answers

September 15, 2020
Updated September 16, 2020

Spatial disorientation among U.S. Air Force pilots has been linked to 72 severe accidents between 1993 and 2013, resulting in 101 deaths and the loss of 65 aircraft. Now DARPA, the defense department's Advanced Research Projects Agency, wants to know whether RF radiation in the cockpit of combat aircraft may be at least partly to blame.

Under the new initiative, with the acronym ICEMAN, DARPA is seeking a contractor to measure the electromagnetic fields inside cockpits, especially signals between 9 kHz and 1 GHz and then determine whether they might affect the performance of pilots. ICEMAN is short for Impact of Cockpit Electro-Magnetics on Aircrew Neurology.

In its request for proposals, DARPA states that, "Current cockpits are flooded with RF noise from on-board emissions, communication links, and navigation electronics, including strong EM fields from audio headsets and helmet tracking technologies." The agency

notes that current tactical audio headsets project magnetic fields that are up to 10 times the strength of the Earth's magnetic field — that is, approximately 5 G (0.5 mT). DARPA continues:

> "Recent DARPA-funded research has demonstrated that human brains sense magnetic fields, like those used by animals for navigation, and that this process is 'jammed' (i.e., disrupted) by radio waves (RF), impacting brainwaves and behavior. Furthermore, recent findings were the first to show that even weak RF fields and 'Earth strength' magnetic fields have measurable, reproducible effects on human brainwaves and unconscious behavior in a controlled environment."

The "recent research" refers to work carried out under DARPA's RadioBio program, announced in 2017. One of its objectives was to see whether living cells can communicate with neighboring cells using EM signals and, if so, what the cells are telling each other and how they do it.

Joe Kirschvink at Caltech, a RadioBio contractor, has reported that human brain waves respond to changes in magnetic fields on the order of the Earth's field.

According to DARPA, the objectives of the ICEMAN project are:

> 1) Measure and manipulate the ambient EM field and RF noise in a typical cockpit;
>
> 2) Measure potential effects of EM stimuli on brain activity, physiology, behavioral responses and physiological sensing systems;
>
> 3) Demonstrate potential strategies to mitigate negative effects on aircrew neurology and sensory function.

The deadline for proposals is October 5.

More on the how DoD defines major aircraft accidents, here.

Iceman was the nom de guerre of a fighter pilot played by Val Kilmer in the movie Top Gun.

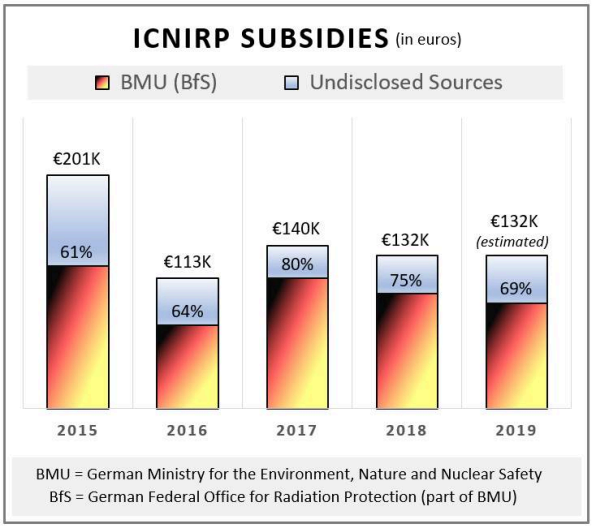
ICNIRP's Principal Patron: Germany

Provided 70-80% of Its Support in Each of Last Three Years

June 25, 2020

The German government is the main sponsor of ICNIRP, the International Commission for Non-Ionizing Radiation Protection.

The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), which is the bureaucratic parent of the Federal Office for Radiation Protection (BfS), has contributed 70-80% of ICNIRP's annual income in each of the last three years. This does not include revenue from the sale of books and fees to attend workshops.



Sources: BMU and ICNIRP

The BMU/BfS has been known to support ICNIRP, but the extent of its funding has only now emerged.

Details of Germany's support for ICNIRP was provided to *Microwave News* by the BMU following an information request.

ICNIRP also receives an "in-kind-contribution" from the BMU: "free" office space in the BfS premises in Oberschleiβheim, near Munich, according to Bastian Zimmermann, a BMU spokesperson.

Among the other agencies that support ICNIRP are: European Union Programme for Employment and Social Innovation "EaSI" (2014–2020), International Radiation Protection Association (IRPA), Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and New Zealand Ministry of Health.

ICNIRP, originally an offshoot of IRPA, was launched in 1992, at the initiative of Michael Repacholi, who at the time was with the Australian Radiation Laboratory (see *MWN,* J/A92, p.12). He served as ICNIRP's first chairman until 1996, when he moved to become the head of the WHO EMF Project, which he also helped set up (see *MWN,* J/A96, p.14).

ICNIRP develops exposure guidelines which are the basis for many national standards, including Germany's. It releases an annual report, but specifics about its finances are sketchy at best.

ICNIRP Issues Revised RF Guidelines

First Update Since 1998

March 11, 2020

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) has issued updated guidelines for exposures to RF/microwave radiation.

"The guidelines have been developed after a thorough review of all relevant scientific literature, scientific workshops and an extensive

public consultation process. They provide protection against all scientifically substantiated adverse health effects due to EMF exposure in the 100 kHz to 300 GHz range," according to Eric van Rongen, the chairman of ICNIRP.

"We know parts of the community are concerned about the safety of 5G and we hope the updated guidelines will help put people at ease," he said. Van Rongen is with the Health Council of the Netherlands.

The new guidelines are published in *Health Physics* and are open access. A copy is available here. They were last updated in 1998.

The ICNIRP press release is here.

See also our recent article on the links between the World Health Organization (WHO) and ICNIRP:
"Will WHO Kick Its ICNIRP Habit?"
and
"How Much Is Safe?: Radiation Authorities Rely on Controversial Group for Safety Advice" from Investigate Europe,

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NTP Scientists Endorse Precaution

First Federal Officials To Take a Stand on Cell Phone Safety

January 17, 2020

NTP scientists have decided to follow the science.

In a recent revision to the information it offers the public on cell phone radiation, the National Toxicology Program (NTP) revealed that its scientists are now taking precautions by spending less time on cell phones and, when on a call, increasing the distance between their heads and the phones.

The NTP released the final report on its $30 million animal study that showed "clear evidence" of a link between cell phone radiation and cancer in late 2018. But until now NTP scientists have downplayed the implications of their findings in public statements.

Indeed, John Bucher, the former associate head of the NTP and the leader of the NTP cell phone project, was asked —at each of the three press conferences held at various stages of the release of the NTP results— whether the cancer findings had changed the way he used his cell phone or the advice he gave his family. In the first two instances, he replied no, and in the third —on issuing the final report— he again said no except when "on a conference call for an hour or two."

That has now changed.

In an email to *Microwave News,* Bucher confirmed that he is following the precautionary steps offered on the NTP website. In a separate exchange, Michael Wyde, who managed the study and continues to run the follow-up work, wrote that he too is taking these precautions.

They and other NTP scientists are, at present, the only ones working for the U.S. government to publicly endorse precaution to reduce microwave exposure from wireless devices.

CDC Once Endorsed Precaution and Then Backed Away

For a brief time in 2014, the U.S. Centers for Disease Control (CDC) endorsed precaution. It quickly reversed direction under pressure from the National Council on Radiation Protection and Measurements, better known by its acronym, NCRP.

Up to now, government scientists have left individuals to make their own decisions to take precautions, favoring the phrase, "if people are concerned about their exposure…" That conditional used to be on the NTP website but has now been removed.

The FDA website continues to suggest precautions only for those who are "concerned."

Here are screenshots of this particular Q&A from the NTP's FAQs before and after the change.

Before:

Q: Have you changed your cell phone use or what you recommend to your family?
A: NTP scientists have become more aware of my usage, but most haven't really changed their habits. If people are concerned about their exposure, they can follow the FDA's tips for reducing exposure to cell phone RFR:

- Reduce the amount of time spent using your cell phone, and
- Use the speaker mode or a headset to place more distance between your head and the cell phone.

After:

Q: Have NTP scientists changed their cell phone use or what they recommend to their families?
A: NTP scientists have become more aware of their usage and follow the FDA's tips for reducing exposure to cell phone RFR:

- Reduce the amount of time spent using your cell phone, and
- Use the speaker mode or a headset to place more distance between your head and the cell phone.

A note of appreciation to the followers of *Microwave News* who send me tips about news and other developments. This story is a case in point: An eagle-eyed reader spotted this change in the NTP FAQs and wrote to me about it. Thank you!

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