Koreans Again Link AM Radio to Childhood Leukemia

RFI Tops Health in U.S. AM Tower Siting Battle

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When the residents of the Oak Hill Park community in the Boston suburb of Newton fought the expansion of a local 5kW AM station, WNUR, they complained about radiofrequency interference (RFI)—to their telephones, stereos, VCRs, wheelchairs and baby monitors. They also objected to the possible effects on local wildlife, particularly to the blue-spotted salamander. And they worried about the visual blight posed by the towers.

What community activists hardly mentioned were the possible impacts on their health.

Bob Sklar, who has a doctorate in molecular biology, was one of the few exceptions. Even with WNUR's power at 5 kW, he and his family had trouble sleeping and suffered from severe headaches. Fighting the plan to increase the total AM power output to up to 150kW, Sklar warned that the proposed higher power levels "will produce serious health effects in the area."

When asked by *Microwave News* why the others had left the health issue on the back burner, Sklar replied, "We were told it's not a winning issue. The consensus was to not raise it."

That may now change.

In the largest and most detailed study of AM radio radiation to date, a team led by Mina Ha of South Korea's Dankook University in South Korea has found that children living within 2km of an AM transmitter had more than twice the risk of developing leukemia, compared to those living more than 20km away. The study, which included 36 cases of children with leukemia living within 2km of an AM station, will appear in the August 1 issue of the *American Journal of Epidemiology* and is already available on the journal's Web site.

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"The results of this study suggest a possible carcinogenic effect of AM RF [radiation] exposure on children, particularly with regard to lymphocytic leukemia," Ha concludes. This is Ha's third epidemiological study of cancer in the vicinity of AM radio stations. The other two, published in 2003 and 2004, also pointed to a cancer risk. (See also *MWN,* S/O02, p.16.)

Ha told *Microwave News* that while the observed risk was significant, she would like to see it replicated in another study. Ha's study included 31 AM stations operating at 20 kW or more.

Five years ago, a group of Italian researchers headed by Paola Michelozzi found higher rates of childhood leukemia around the Radio Vatican transmitters in Cesano outside Rome (see *MWN,* M/A01, p.6; S/O01 p.9; M/J02 p.4; J/A02 p.14). Radio Vatican operates at a number of different frequencies, in both the AM and shortwave (4-21 MHz) bands.

When Ha compared cases and controls relative to estimated RF exposures, she found that the risk was significantly higher for those in the second and third exposure quartiles, but not in the 25% most exposed children. Nevertheless there was a trend of increased risk of lymphocytic leukemia with increased RF exposure, which was of borderline significance. (There was no parallel trend with distance from a transmitter.)

Regarding the lack of an association among those who are most exposed to RF, Ha suggested that it might be due to "decreasing statistical power" or to a "bystander effect."

Ha estimates that the electric field at 2 km from the AM transmitters ranged from 1 V/m to 3 V/m —approximately 0.26 μW/cm^2 to 2.4 μW/cm^2.

Oak Hill Park Is Within 2 Km of AM Tower

The entire Oak Hill Park community in Newton, outside Boston, lies within 2 km of WNUR's 5 kW transmitter. Approximately 1,000 to 1,500 people live there.

About 45 of the homes in the neighborhood are exposed to RF levels of 6.1 V/m (10 μW/cm^2) or more, with some 400 homes above 1.9 V/m (1 μW/cm^2), according to an analysis by Richard Temkin, a research physicist at MIT and, like Sklar, a former long-time resident of Oak Hill Park. Temkin estimated that if the power output were to be increased to 150 kW, thousands of homes in Newton would be exposed to 1.9 V/m or more.

Temkin's case against the power upgrade was based almost exclusively on RFI. He was one of those who argued against basing the community's appeal on health concerns, according to Sklar. Temkin did not respond to repeated requests for an interview.

The power output of the AM broadcasts in Newton will soon jump from 5 kW to 95 kW, and possibly even higher. Yet, even at 5 kW, Oak Hill residents could hear music from the radio station coming from all sorts of electronic equipment as well as water pipes,

heaters and toilets. "We're all fearful that all the interference problems will increase exponentially," one resident told the *Boston Globe* in the fall of 2005, after a court ruled that the plan to upgrade the AM station could move forward.

In an August 17, 2005 decision, Charles Trombly Jr of the Massachusetts Land Court had ruled against all the objections raised by the town of Newton on the basis that the FCC has the "sole power" to regulate radio stations and any RFI. A month earlier the town aldermen had voted unanimously to deny the three broadcasterrs a permit to expand.

While the residents hardly raised the health issue, the radio stations brought in two consulting firms that help corporations mired in EMF and RF health disputes: Gradient Corp and Exponent. A report prepared by Gradient's Peter Valberg concluded that "careful review of the whole body of literature… have [sic] not identified reasons to believe that the current RF safety standards are not protective of public health." Exponent's Linda Erdreich also prepared a report that sought to reassure the town that there was little to worry about.

Valberg did his own RF measurements. He found that the RF levels were somewhat higher than those estimated by Temkin. Valberg's highest reading was 13.7 V/m (50 μW/cm^2) with average readings in Oak Park of 3.8 V/m (3.8 μW/cm^2) during the night and 4.9 V/m (6.4 μW/cm^2) during the day. Jim Hatfield of Hatfield and Dawson, a consulting firm in Seattle, also did an RF survey for the three AM stations [Hatfield's report is appended to Valberg's report].

(For comparison, the FCC and the IEEE/ANSI exposure standards for AM frequencies are both 614 V/m (100,000 μW/cm^2). The ICNIRP standard is 87 V/m (2,007 μW/cm^2).

Valberg and Exponent's Bill Bailey are currently involved in establishing siting policy for power lines in Connecticut (see our **January 19, 2007** story).

Osepchuk Sides with the Residents

One ironic aspect of the Newton battle is that John Osepchuk, one of the chief architects of the IEEE/ANSI standard, argued against the AM upgrade, while the Silent Spring Institute, a local environmental group, offered no help, telling Bob Sklar that its focus was on chemical pollutants.

"Even at 5 kW, you can hear sounds from baseboard heaters," Osepchuk told *Microwave News*. He stressed that the problem is not the ambient fields but the current in the wires and pipes. "The shocks and burns are annoying and people should not have to put up with them." In 1995, after spending most of his career at Raytheon, Osepchuk opened his own firm, Full Spectrum Consulting in Concord, MA.

Osepchuk expressed dismay at the FCC's refusal to address the side effects of AM radiation, such as the "tingles and sound generation" —pointing out that the commission had deferred setting

limits on contacts and induced currents. But Osepchuk reserved the greatest contempt for the judge's decision overruling Newton's decision not to grant the AM stations a permit. "The judge says that those who are 'aggrieved' by his decision can always complain to the FCC —is he kidding?"

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Spokane AM Station Moved After Parents Raised Health Concerns

In Spokane, WA, parents succeeded in moving KGA's 50 kW AM radio tramsmitter away from the Mullan Road Elementary School next door—but only after a more than decade-long battle over possible health impacts.

The towers came down in August 1997; the parents had raised concerns as early as May 1985. The families were put on the alert after the *Washington Post* published a list of more than 200 radio stations across the country, including some in Spokane, which might cause excessive radiation exposure (see *MWN,* My85). Even earlier, when the school was being built in the late 1970s, workers complained of getting electrical shocks from the KGA tower radiation. The school later installed electrical grounding to the roof to mitigate this problem.

In 1987, an EPA-FCC team, which included then EPA's Ed Mantiply and FCC's Bob Cleveland, measured an electric field of 13.9 V/m (51.2 μW/cm^2 at the front door of the school —an exceptionally high reading for a publicly accessible area, though well within the current FCC exposure standard (see report No.EPA/520/6-88/008).

(Mantiply is now with the FCC's RF safety program; Cleveland retired from the FCC earlier this year.)

In 1986, KGA was sued by the family of Janice DiLuzio, who had died in 1985 of multiple myeloma. The DiLuzios had moved to a house approximately 600 feet from KGA's 50 kW transmitter in 1972. The wrongful death suit was settled out of court and the details of the settlement were kept confidential (see *MWN,* S/O86 and S/O89).

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AM Radiation Levels in the U.S.

It's been a long time since the EPA or the FCC surveyed the RF radiation levels in the vicinity of AM radio stations.

In 1991, Ed Mantiply and Bob Cleveland measured the electric and magnetic fields at distances of up to 100 m from eight AM broadcast stations. According to their report, the electric fields 2m from the base of a 50 kW transmitter was 491 V/m (63,947 μW/cm^2). At a distance of 100 m, the electric field was on the order of 20-30 V/m (106-238 μW/cm^2).

Back in mid-1970s, the EPA surveyed the RF levels at 193 sites in seven U.S. cities (Atlanta, Boston, Chicago, Miami, New York, Philadelphia and Washington DC). The highest reading in the 0-2 MHz band was 1.9 V/m (0.94 μW/cm^2) on Bird Drive Park in Miami. (See report No.EPA-520/2-77-008, May 1978.) FCC's Mantiply was also a member of that EPA measurement team, as was Norb Hankin, who today still works in the EPA's Washington office.

There are approximately 4,800 AM stations in the U.S., operating in the 520 kHz to 1.6 MHz frequency band. Their maximum power authorized power is 50 kW. European transmitters can use higher power levels.

Some Korean AM stations operate at much higher power levels than those in the U.S. Mina Ha's study included four at 1,000kW and one at 1,500 kW. The original purpose of the 1,500 kW station was to broadcast political messages over the DMZ into North Korea, Ha said.

AM radio, Mina Ha, Korea, FCC, IEEE, ANSI, EMI, RFI, KGA, Robert Cleveland, Ed Mantiply, Peter Valberg, Exponent, Gradient, Paola Michelozzi, Richard Temkin, Jim Hatified, Janice DiLuzio, John Osepchuk, William Bailey,

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