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October 14, 2008

Association of Commuter Rail Employees  
Division 1  
420 Lexington Avenue, Suite 215  
New York, NY 10170

Attn: Anthony Bottalico  
Executive Director

Re: Association of Commuter Rail Employees  
Metro-North Railroad Ticket Issuing Machine Program  
Our File No. 4421

Dear Mr. Bottalico:

At your request, we have reviewed Metro-North Railroad's ("Metro-North") implementation of the Ticket Issuing Machine ("TIM") program by outfitting conductors with hand-held devices which print tickets and store fare data. The hand-held device that Metro-North has selected, the Intermec CN3 portable computer ("Intermec computer"), utilizes Bluetooth<sup>®</sup>, Cellular Properties, and WiFi<sup>®</sup> capabilities—radio technologies which generate, use, and radiate radio frequencies. Due to the concerns of Association of Commuter Rail Employees ("ACRE") union members, Holm & O'Hara LLP ("H&O") has reviewed legal precedents related to exposure to radio frequencies. Based upon scientific evidence known to date and legal precedents, we do not believe the program can be challenged and or a refusal to work with the device can be defended.

Background of Radio Frequency and Federal Communications Commission Regulation

The radio waves that make wireless communications possible also produce electromagnetic energy fields ("EMF") and heat that can change or damage tissue under certain circumstances. Antennae used for wireless communication emit radio frequency ("RF") energy, a form of radiation. RF radiation is not radioactive, like stronger forms of radiation such as X-rays or gamma rays, and does not undergo the process of ionization, in which electrons are

stripped from atoms and molecules. This ionization process can produce molecular changes that lead to damage in biological tissue, especially DNA.

RF radiation is low-frequency, non-ionizing electromagnetic radiation, similar to visible light, infrared light, and microwaves. Wireless telephone handsets produce low-level RF energy. Other common sources of RF emissions include radio and television antennae, computers and radar.

The only known risk posed by non-ionizing radiation is the ability to rapidly heat biological tissue. This process is the same as that utilized by microwave ovens. RF only poses a danger to rapidly heating human tissue at levels of high exposure, to which the eyes and testes are particularly vulnerable because of their inability to diffuse heat.

The Federal Communications Commission ("FCC") regulates limits for safe exposure to RF energy. In August 1996, the FCC adopted a new, lower standard to minimize the thermal exposure of wireless devices based on the "Specific Absorption Rate" ("SAR"), which is a measure of the amount of RF energy absorbed by the body when using communication devices. SAR is expressed as energy flow (power) per unit of mass in units of watts per kilogram ("W/kg"). In the United States, the FCC requires communication and other wireless devices, including the Intermec computer, to comply with a maximum SAR of 1.6 W/kg. Therefore, any such device at or below this SAR level is a "safe" device, as measured by this standard.

As listed in the Intermec CN3 Compliance Insert, referencing the configuration selected by Metro-North Railroad for body worn operation, the highest SAR value for the Model CN3, as tested by Compliance Certification Services, Inc. ("CCS"), a FCC-approved testing laboratory, is 0.520 W/kg. This value is considerably less than the 1.6W/kg SAR limited established by the FCC and therefore meets the FCC RF exposure guidelines.

In 1985, after seeking consensus among participating experts and after public notice and comment, the FCC adopted guidelines for human exposure to RF radiation from FCC-regulated transmitters and facilities. The guidelines were required by the National Environmental Policy Act ("NEPA"), 42 U.S.C. §§ 4321 et seq., and the Council on Environmental Quality ("CEQ") regulations promulgated thereunder, see 40 C.F.R. §§ 1500.1 et seq. In promulgating its rules, the FCC adopted the guidelines issued in 1982 by the American National Standards Institute ("ANSI"), a recognized standard-setting organization. See Biological Effects of Radiofrequency Radiation, 100 F.C.C.2d 543 (1985).

The exposure limits in the ANSI standard were derived from work done by the United States Navy and the Institute of Electric and Electronics Engineers ("IEEE") before 1960. For this reason, the standard is based primarily on thermal effects of microwave technology. ANSI reviewed the standard every five years and either confirmed or revised it. The 1982 guidelines were the first major changes made since the original standard issued in 1966. Due to dissension

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1. Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, 11 FCC Red 15123 (1996) (the "Guidelines").

and liability concerns. In November 1992, ANSI deferred to and ratified the IEEE's more restrictive health standard for RF exposure<sup>2</sup> established in 1991 since the IEEE is a larger, international organization.

The new ANSI standard prompted the FCC to propose updating its existing guidelines. See Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation, 8 FCC Rcd 2849 (1993). In the 1993 proposal that was sent out for notice and comment, the FCC noted that the 1992 ANSI standard was less restrictive than two other standards: those issued by the congressionally chartered National Council on Radiation Protection and Measurements ("NCRP"), and those proposed by the International Radiation Protection Association. During the comment period, the FCC received submissions from, among others, the Environmental Protection Agency ("EPA"), the Food and Drug Administration ("FDA"), the Occupational Safety and Health Administration ("OSHA"), and the National Institute for Occupational Safety and Health ("NIOSH"). Ultimately, the FCC adopted guidelines that combined the NCRP standard with the ANSI standard (the "Guidelines").

Several parties filed petitions for reconsideration of the FCC's Guidelines. Some sought slightly stricter standards, and others sought to persuade the FCC to adopt the more restrictive ANSI standard wholesale. The FCC ultimately declined to adopt an unmodified ANSI standard or to tighten its own guidelines, except in minor respects. While the FCC was considering the proposed guidelines, Congress passed the Telecommunications Act of 1996, Pub. L. No. 104-104, 110 Stat. 56 (the "Act").

Currently, the FCC and the Food and Drug Administration ("FDA") participate in the World Health Organization's ("WHO's") International EMF Project, which seeks to coordinate and compile all information relating to the possible health risks associated with EMF. The International EMF Project began a multinational epidemiological study called INTERPHONE to determine if mobile phone use is associated with increased head and neck cancers. The report is scheduled to release final results in 2011. Please remember that cell phones have higher SAR levels than the Intermec computer.

On October 8, 2008, the INTERPHONE study released an update of current studies. In most of their studies, the Odds Ratio of a subject with a tumor having ever used a mobile phone was less than 1, indicating that mobile phone use did not increase the risk of developing a tumor. However, some of the studies did seem to indicate an increased risk for glioma tumors on the side of the head where a cell phone was most commonly held after ten or more years of use. The INTERPHONE study, however, indicates that it is not clear from these results if there is a **causal** relationship between cell phone use and tumors. The measurement of cell phone usage is based on the subjects' recollection and differences in the reported use between subjects may impact the results.

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<sup>2</sup> This standard was originally developed by the Institute of Electrical and Electronic Engineering ("IEEE"), and a subgroup within the IEEE monitors the continued validity of the standard.

### Legal Challenges to the FCC Guidelines

In 2000, petitioners in the case of Cellular Phone Taskforce v. FCC claimed that the FCC guidelines were arbitrary and capricious because they failed to account for non-thermal effects of RF radiation. Cellular Phone Taskforce v. FCC, 205 F.3d 82 (2d Cir. 2000). However, in basing its guidelines on a combination of the ANSI and the NCRP standards, the FCC stated that:

[The] guidelines are based on recommendations of expert organizations and federal agencies with responsibilities for health and safety. It would be impracticable for us to independently evaluate the significance of studies purporting to show biological effects, determine if such effects constitute a safety hazard, and then adopt stricter standards than those advocated by federal health and safety agencies. This is especially true for such controversial issues as non-thermal effects and whether certain individuals might be "hypersensitive" or "electrosensitive."

The Second Circuit held that after examining the evidence, the FCC was justified in continuing to rely on the ANSI and NCRP standards absent new evidence indicating that the fundamental scientific understanding underlying the ANSI and NCRP standards was no longer valid. All of the expert agencies consulted were aware of the FCC's reliance on the ANSI and NCRP standards; each had been advised of such evidence of non-thermal health effects as may have existed and still found the FCC's approach to be satisfactory. At most, the newly submitted evidence established that the existence of non-thermal effects was "controversial," and that room for disagreement exists among experts in the field.

Furthermore, the Second Circuit held that the FCC satisfied itself that there was a mechanism in place for accommodating changes in scientific knowledge. Both the ANSI and the NCRP had "committees that are working on revisions of their respective exposure guidelines," and that "ongoing research in a number of areas may ultimately result in changes in the fundamental understandings upon which [the ANSI] and the NCRP [standards] are based," and that it would "consider amending [its] rules at any appropriate time if these groups conclude that such action is desirable." Because the new evidence consisted of publicly available scientific papers, the FCC could reasonably expect it to be considered by the ANSI and the NCRP standing committees that were working on revising their standards.

As for the Petitioners' criticism of the FCC for not adopting the NCRP's recommendations for stricter standards in situations of exposure to deep modulated extremely low frequency ("ELF") carrying waves,<sup>3</sup> the Second Circuit held that it was not arbitrary and capricious for the FCC to reject the NCRP recommendation. The scientific data were inconclusive on the dangers presented by such radiation, and thus did not mandate a determination different from that reached by the FCC.<sup>4</sup>

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<sup>3</sup> The NCRP had recommended that the exposure criteria in such situations be the same for occupational exposures as for the general population in order to provide for an additional safety margin.

<sup>4</sup> The NCRP itself had concluded that the existence of modulation effects was unclear. Moreover, the EPA had recommended that "while studies continue to be published describing biological responses to non-thermal, ELF-

The Second Circuit concluded that the argument that the FCC should create greater safety margins in its guidelines to account for uncertain data is a policy question, not a legal one. FCC's policy conclusion was not irrational, arbitrary nor capricious and the Second Circuit declined to disturb it.

The Petitioners also faulted the FCC for (1) adopting a two-tiered MPE level system allowing for higher exposure in "occupational controlled" situations than in "general population uncontrolled" situations despite expressions of concern with these definitions by EPA, NIOSH and OSHA; and (2) refusing to adopt ANSI's recommendations on induced and contact currents. The Second Circuit disagreed.<sup>5</sup>

In addition to arguing that the Maximum Permitted Exposure ("MPE") levels do not account for non-thermal effects, petitioners also argued that the MPE levels were arbitrary and capricious but the Second Circuit held that these were unavailing arguments.

In the case of EMR Network v. FCC, non-thermal RF radiation levels emitted from facilities for radio, TV, and cell phone communications, and cell phones themselves, were again at issue for possibly having adverse health effects. EMR Network v. FCC, 391 F. 3d 269 (D.C. Cir. 2004). EMR Network filed a petition asking the FCC to initiate an inquiry on the need to revise the regulations to address non-thermal effects. The DC Circuit held that the FCC properly credited outside experts and that there was no other comparable group of experts with which to consult.

#### Legal Concerns and Establishing a Causal Link

It has been known for many years that exposure to high levels of RF radiation can be harmful because it can heat biological tissues rapidly. However, it is not known whether non-ionizing, low-frequency RF radiation from wireless devices is associated with cancer risk. What is known is that there are conflicting data on the effects of the type of radiation emitted from cellular phones, and lack of data on their long-term effects.

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modulated RF radiation, the effects information is not yet sufficient to be used as a basis for exposure criteria to protect the public against adverse human health effects." ANSI had likewise found that "no reliable scientific data exist indicating that . . . modulation-specific [disease-related conditions] of exposure may be meaningfully related to human health."

<sup>5</sup> The FCC found that applying the general-population limits to all situations "would impose significant and unnecessary economic and technical burdens for which adequate justification has not been presented." The FCC elected instead to clarify the differentiation between occupational and general population circumstances. With respect to induced contact currents, the FCC concluded that "because of the many possible types and configurations of metallic objects that may be near a transmitter," it would be impracticable to demonstrate compliance. However, the FCC "recognized the desirability for limits to be adopted in the future," and promised to "monitor the issues raised . . . [and] revisit this issue" as measuring technology improves. The Second Circuit held that the FCC reached a reasoned conclusion to a difficult problem, and was not arbitrary or capricious.

Although research to date has not proven that wireless phone use causes health problems such as cancer, brain tumors or DNA damage, researchers and the industry agree that more long-term studies are needed.

The concern in EMF litigation is exposure to radiation from EMF. Radiation from EMF can be toxic if it is ionizing. Whether the non-ionizing radiation is also toxic is the subject of the EMF controversy. Thus far, EMF cases have fallen under toxic tort litigation because plaintiffs have claimed that EMF waves are created by cellular phones and other products, which can be toxic and ultimately cause adverse health effects in people who live near, or use, or work with such products.

However, an obstacle that plaintiffs must overcome in bringing EMF lawsuits is establishing causation: (1) First, they must prove that exposure to radiation from electromagnetic fields exists; (2) Secondly, they must establish that exposure to the defendant's EMF generating product was the proximate cause of the injury; and (3) Finally, the plaintiffs must demonstrate by medical evidence or expert testimony that the defendant's product was a substantial contributing factor in their injury.

#### EMF Workers Compensation Claims

EMF-related workers compensation cases usually arise when a party alleges that he/she has suffered some personal harm or injury, due to occupational exposure to EMFs. Pilisuk v. Seattle City Light Company is one of the most notable EMF-related workers compensation cases. Pilisuk v. Seattle City Light Company, No. 9212051 (Wash. Bd. Indus. Ins. App. 1994) In this case, the Washington State Workers Compensation Appeals Board upheld an earlier state agency decision, which ruled that EMFs did not cause a Seattle City Light worker's leukemia.

The lawsuit was originally filed in 1991 by the widow of the deceased worker, Roberta Pilisuk, a utility cable splicer and maintenance electrician who worked for the Seattle City Light Company for nearly seven years. She claimed that she was entitled to worker's compensation benefits on behalf of her husband alleging that he died from leukemia caused by his exposure to high levels of EMF "produced by the electric currents around power lines and substations where he worked."

The judge ruled that "Mr. Pilisuk's leukemia was not naturally and proximately caused by his exposure to EMFs during the course of his employment at Seattle City Light." He added that "while the theory that EMF promotes or co-promotes leukemia is plausible, it is not probable." The judge further stated that even if one assumes "that EMFs are capable of acting as a promoter, it is impossible to conclude that the exposure naturally and proximately caused Mr. Pilisuk's leukemia." The judge concluded that "the preponderance of evidence suggests that EMF is neither an initiator nor a promoter of leukemia." The widow's further petition for review was dismissed by the state's Board of Industrial Insurance Appeal. The Board upheld the judge's decision.

This ruling is consistent with similar lawsuit outcomes and it reflects the state of the science. that there is no proven cause-and-effect relationship between EMF and health effects.

In the case of Holbrook and Department of Transportation, the U.S. Department of Labor Employees Compensation Appeal Board found that the weight of the evidence failed to establish that appellants' bilateral cataract condition was causally related to exposure to non-ionizing radiation in the course of his federal employment. Holbrook and Department of Transportation, 1997 ECAB LEXIS 3443. Where there exists opposing medical reports of virtually equal weight and rationale, and the case is referred to an impartial medical specialist for the purpose of resolving the conflict, the opinion of such specialist, if sufficiently well rationalized and based upon a proper factual background, must be given special weight and is sufficient to resolve the conflict in medical opinion on the issue of causal relationship.

#### Personal Injury Cases Involving Electronic Products and EMFs

In the case of Vaughters v. Consolidated Edison Company of New York, Shirley Marano alleged that EMF from a transformer under the floor in her Manhattan office building caused her ovarian, colon and breast cancers. In April 1997, New York Supreme Court Judge Alice Schlesinger decided that, after reviewing expert medical testimony offered by Con Edison, the plaintiffs were "unable to raise an issue of fact with respect to their claim that electromagnetic fields were a proximate cause of the cancers in Shirley Marano."<sup>6</sup>

In the case of Bendure v. Kustom Signals Inc., the plaintiff, a police officer, alleged that exposure to EMFs from a hand-held traffic radar gun, manufactured by the defendants had caused his non-Hodgkins lymphoma. Bendure v. Kustom Signals Inc., Civ. No. C911173SAW (N.D. Cal. Jan. 20 1993). Plaintiff's attorneys "relied on animal and test-tube studies to try to convince the jury that Bendure's lymphoma was radar-related." Even though expert evidence was used to help the court in comparing the frequency of cancer found in police officers who used radar devices, as opposed to the frequency of cancer in those who did not, a California jury unanimously found for the defendants. The jury did not believe the plaintiff's injury was caused by exposure to EMFs from radar guns manufactured by the defendant.

On February 27, 1995, Cook County Circuit Court Judge Margaret Stanton McBride dismissed a class action suit filed by Harold Blesy and five other police officers suffering from cancer seeking medical monitoring of police radar equipment users. Blesy v. Kustom Signals Inc.

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<sup>6</sup> Central to Con Edison's evidentiary submissions was an affidavit by Darwin R. Labarthe, M.D., Ph.D. Dr. Labarthe told the court that of the numerous studies on EMFs and cancer, only one discussed a possible relationship between EMFs and ovarian cancer and that one found "no relation apparent between exposure and disease." Con Edison was also supported in its motion by an amicus brief filed by the Atlantic Legal Foundation, which dealt in depth with the current state of scientific knowledge regarding EMFs and cancer and showed there is a "lack of any conclusive scientific evidence connecting the two." In its opposition to Con Edison's motion for summary judgment, the Marano estate offered an affidavit from Occupational Safety and Health Administration Technical Information Specialist Marija Hughes whom Judge Schlesinger found unqualified to give an opinion "to any degree of medical or scientific certainty."

Widespread fears that cellphones could increase the risk of brain cancer began in January 1993 when David Reynard, whose wife talked on a cellphone "all the time" and subsequently died of brain cancer, appeared on "Larry King Live" and told viewers he was suing the cellphone industry on the ground that it was responsible for his wife's illness. Reynard v. NEC Corporation. Judge Ralph W. Nimmons Jr. from the U.S. District in Tampa, Florida dismissed the lawsuit filed against NEC Corp. and GTE Mobilnet, the unit of GTE that provided Susan Ellen Reynard with the cellular service, because of a lack of scientific or medical research into the issue.

Debra Wright, an Arizona-based manager for Bell Atlantic Mobile, filed a personal injury lawsuit in state court in Chicago claiming that portable cellular phones produced by Motorola, Inc. caused or aggravated her brain tumor. Wright v. Motorola, Inc. Motorola was also charged with failure to test its phones for safety or to warn users of health risks, and of conspiring with other parties to deceive the public about the health risks posed by cellular phones. The other parties named in the suit were the Cellular Telecommunications Industry Association (CTIA), Dr. George Carlo of CTIA's Scientific Advisory Group on Wireless Technology, Ron Nessen, CTIA Vice President for Public Affairs and Communications, and Carlo's consulting company, Health and Environmental Sciences Group Ltd.

In 1996, Cook County Circuit Court Judge Paddy H. McNamara dismissed Dr. George Carlo and his Washington, DC research firm Health and Environmental Sciences Group from the suit for failure of plaintiff to allege any proximate cause between their acts and Wright's damages.

In the case of Rittman v. Motorola, Inc., Dr. Rittmann, a physician, died allegedly of brain cancer due to extensive cellular telephone usage. A suit by his estate was first filed in 1995 in Tarrant County District Court alleging that Motorola, Inc., NEC USA, Inc., General Electric Co. and Ericsson Inc. negligently designed cellular telephone products. The suit also alleged that Rittmann used "defectively designed and manufactured" cellular phones between 1988 and his death in 1994. It was held that the claim is preempted by the Communications Act of 1934 and the Telecommunications Act of 1996 and that state regulation of electronic products that emit electromagnetic energy is also preempted under 1995's Electronic Products Radiation Control Act.

In Verb v. Motorola, Inc., cellular phone users brought a class action suit against various cellular phone manufacturers, including Motorola. Verb v. Motorola, Inc., 672 N.E.2d 1287 (Ill. Dist. Ct. App. 1996). The plaintiffs claimed that their cellular phones should have been

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The way in which the expert witness was used to prove (or disprove) causation was by drawing the court's attention to the frequency of the use of cellular phones in terms of the probability of a person owning one such item; and then examining the probability of a brain tumor occurring in a population. It was given in evidence that, although brain tumors were relatively rare, in the American population, on average, 11,000 deaths occurred from this type of cancer per year. It was pointed out that without the help of additional data or information, it would be difficult to prove the question of whether the use of the phone was likely to cause the disease suffered by the plaintiff, or whether the two incidents had occurred together simply by chance.

accompanied by warnings that use of the phones may cause an increased health risk. In addition, plaintiffs alleged that the design of cellular phones causes an increase in health risks to the plaintiffs under claims of warranty of fitness, negligence, strict liability, consumer fraud, and deceptive trade practices. The trial court dismissed the class action and held that the subject matter of the plaintiffs' action was preempted by federal law. The court also ruled that the plaintiffs did not allege a compensable injury. The plaintiffs appealed.

The Illinois Appellate Court partially affirmed. The court ruled that regulations of the FCC did not preempt state action against the manufacturers, as ruled by the trial court. It found, however, that "the FDA does preempt a state's power over the issues in the case ... because the FDA directly regulates electronic products that emit radiation with regard to public health." The court found that the Electronic Product Radiation Control Act authorized the FDA to "... prescribe performance standards for electronic products to control the emission of radiation from such products, if it determines that such standards are necessary for the protection of public health and safety ...." It found that under the Product Radiation Control Act "no state shall have the authority to act in conflict with that prescribed standard" once a FDA standard is in place.

The court also ruled that the plaintiffs' future personal injury and damages claim "constitute conjecture and speculation." The court noted that the plaintiffs failed to plead specific facts and that any of the plaintiffs may "have discontinued the frequency of the use of their cellular telephones, or that the telephones have diminished in value." The court concluded that plaintiffs' complaint failed to state a cause of action "because plaintiffs' claims are all based upon mere theoretical possibilities of injury and or damages."

The case of Newman v. Motorola, Inc. gained national headlines because many viewed the decision by the court as a major setback for future plaintiffs who want to bring lawsuits against the cellular phone industry. Newman v. Motorola, Inc., 218 F. Supp. 2d 783 (D. Md. 2002). Specifically, the Newman decision is crippling for those plaintiffs who would allege that their cellular phones caused their brain cancer or other health defects.

In 2000, Dr. Christopher Newman filed a lawsuit in a Maryland federal court against the cellular phone company Motorola, Inc., and numerous other defendants claiming that the Motorola cellular phone he had used was the cause of his cancerous brain tumor. Specifically, Dr. Newman alleged in his complaint that the cause of his cancer was his cell phone use between 1992 and 1998.

Most of the court's opinion focuses not so much on the substance of his claim, but in dismissing the claims against many of the defendants. The court ruled that many of the defendants had no connection to the purchase of the plaintiff's cellular phone, or were too far down the causal chain.

Moreover, one of the reasons that the lower court in Newman ruled against the plaintiff was because the judge would not admit potential scientific evidence into the trial offered by the plaintiff about an alleged link between plaintiff's cellular phone and his cancer.

### Conclusion


Unfortunately, due to the present state of scientific knowledge on EMFs, plaintiffs will continue to lose these cases unless new scientific studies definitively link EMF exposure to adverse health risks or injury, possibly when the World Health Organization releases the final results of its INTERPHONE study in 2011.

Since the non-thermal risks of RF radiation cannot be proven, the Intermec computer can only be evaluated on its thermal risk and its RF emissions based on SAR. As noted previously, the Intermec computer model in question tested at a level of 0.520 W/kg at its peak. Not only is this well below the limit imposed by the FCC, but it is below the level emitted by most cell phones. Enclosed are rankings of the ten (10) cell phones with the highest and lowest SAR levels available in the United States. The highest level cell phones range from 1.49 W/kg to 1.6 W/kg. The lowest level phones range from 0.14 W/kg to 0.486 W/kg, just below the highest rating for the Intermec computer.

If ACRE wishes to independently test the Intermec computer's SAR level, we have received one estimate from PCTest Engineering Laboratory, Inc. in the amount of approximately \$25,000. That amount estimates a testing period of five (5) days at \$5,000 per day. The testing time and cost may be greater or smaller depending on the exact specifications of the Intermec computer and the specific type of testing. This test will not establish any causal relationship, only verify or contradict the SAR previously found by the other laboratory.

Based on the scientific evidence currently available, the Intermec computer emits a very low level of RF radiation and there is no conclusive scientific evidence of causally related health risks to ACRE members.

Very truly yours,



Vincent F. O'Hara

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## 10 highest-radiation cell phones (United States)

*Editor's note: When a phone is discontinued by a manufacturer or a carrier, it will be removed from this chart.*

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► [Rugged U.S. Starcom](#)

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► [Motorola](#)

► [Nokia](#)

► [Palm](#)

► [Pantech](#)

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Manufacturer and model

- 1 Motorola V196s
- 2 Motorola W395
- 2a RIM BlackBerry Curve 8330 Sprint
- 2b RIM BlackBerry Curve 8330 Verizon Wireless
- 5 Motorola Deluxe 6802
- 5a T-Mobile Shadow -TC
- 5c Motorola 335
- 6 Samsung Sync SGH-D417
- 9 -TC SMT5800
- 9a Motorola Z6c

SAR level(digital)

- 1.6
- 1.64
- 1.64
- 1.64
- 1.53
- 1.53
- 1.53
- 1.51
- 1.49
- 1.49

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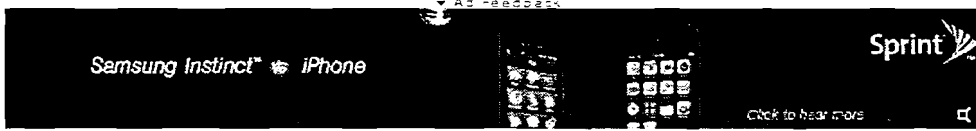
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## 10 lowest-radiation cell phones (United States)

*Editor's note: When a phone is discontinued by a manufacturer or a carrier, it will be removed from this chart.*

By manufacturer	Manufacturer and model	SAR level(digital)
Audiovox UTStarcom	1 Motorola Razr V3x	0.14
	2 Samsung SGH-G800	0.23
	3 Samsung Soli	0.24
Kyocera	4 Nokia 7390	0.26
	5 Motorola Razr2 v8	0.35
LG	6 Samsung SGH-T229	0.383
	7 Nokia 6260	0.43
Motorola	8 Samsung SGH-A60	0.457
	9 Samsung SLM SGH-A747	0.479
	10 Samsung Access SGH-A827	0.488

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- Pantech
- RIM
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